DOCUMENT RESUME

ED 053 759 LI 002 993

AUTHOR Murray, Olin B., Jr.
TITLE Knowledge, Universities, and Libraries: Some Social-Functional Aspects of Interinstitutional Rationalization in Canada.
PUB DATE 70
NOTE 62p.; (115 References); Paper presented at Fall Meeting of Canadian Association of College and University Libraries...occasion of Annual Meeting of Assoc. of Universities & Colleges of Canada, Winnipeg, Manitoba, Nov. 2, 1970

EDRS PRICE EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS *Archives, College Libraries, *Information Storage, Library Collections, Library Materials, *Professional Recognition, *Status Need, *University Libraries
IDENTIFIERS *Canada

ABSTRACT

Libraries are different things to different people as well as different things to the same people. In the university environment, the library has an important function as an articulating symbol, as the tangible reference point of the value system of the "examined life." Nothing else so well symbolizes the broad cultural aims of education and research. The exclusive focus on the production-control functions of libraries has obscured some of the important latent functions of the library as a monument. There is an urgent need for a new definition of archive publication if the integrity of the research process is to be preserved. In view of what is known of the scholarly process, and the reward system which supports the dedication of the scholar to research, it is unlikely that scholars will willingly surrender their demand for a tangible and even somewhat idiosyncratic mode of physical substantiation of their research output. (Author)

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY

ED053759

Knowledge, Universities, and Libraries: Some Social-Functional Aspects of Interinstitutional Rationalization in Canada

by

Olin B. Murray, Jr.
Coordinator of Collection Development
University Library
University of Alberta

DRAFT

LI 002 993

(Paper presented at the Fall Meeting of the
Canadian Association of College and University Libraries,
on the occasion of the Annual Meeting of the
Association of Universities and Colleges of Canada,
November 2, 1970
Winnipeg, Manitoba)

CANADIAN ASSOCIATION OF COLLEGE AND UNIVERSITY LIBRARIES
ASSOCIATION CANADIENNE DES BIBLIOTHEQUES DE COLLEGE ET D'UNIVERSITE

FALL MEETING, NOVEMBER 2-3, 1970
Winnipeg, Winnipeg Inn

MONDAY
NOVEMBER 2

9.30 EXECUTIVE MEETING (CLOSED)

14.00 NATIONAL COOPERATION IN CANADA IN THE PROVISION AND SHARING OF LIBRARY RESOURCES

Speaker: Mr. Olin Murray, Jr.
Co-ordinator of Collection Development,
University of Alberta

Panel: Mr. Louis Vagianos, Director of Communications, Dalhousie
Mr. Daniel Croteau, Conservateur, U. de Sherbrooke
Mr. William Dollar, Head Librarian, U. of Windsor
Mr. Basil Stuart-Stubbs, Head Librarian, U.B.C.

National Cooperation in Canada in the Provision and Sharing of Library Resources.*

In dealing with this topic, I shall try to pose three main questions to which I shall supply provisional answers. My questions should hopefully furnish a framework for further discussion and clarification by those more expert in specific areas.

These questions are:

1. What are the incentives to the rationalization of higher education and library resources at the national level, and how valid are these perceived incentives.

2. What components of the total academic or scholarly communication process are susceptible to rationalization or desirable to rationalize?

3. What, in view of the opportunities and constraints, are the feasible alternatives?

I. The Incentives to Rationalization of Library Resources.

A further review of the question may be redundant, but perhaps justified, if by identifying the sources of these pressures, we may also discern, however darkly, the sources of possible solutions not seen before. To approach the problem in a fundamental way, then, we should ask: Why do we need to rationalize at all? Is there, in fact, any compelling evidence that things are not just as well left as they are?

The forces acting as incentives to rationalization seem to break down into the following classes, which are of course interrelated:

1. Economic constraints.

2. Political constraints.

3. The contemporary communication demands of research and scholarship.

*Among others, I am especially indebted to Dr. David Otto, Office of Institutional Research, University of Alberta, for stimulating discussion and helpful guidance on systems and organizational concepts. However, I am alone responsible for all errors and shortcomings.

1. Economic Constraints.

1. Since 1969 the Federal and provincial governments have exercised a Policy of economic stringency toward higher education, with no apparent let-up in sight at the present time.

2. Considerable public doubt has arisen about the economic returns on public investment in higher education.

3. Institutions of higher education are in a permanent rising-cost syndrome, as compared with the general sectors of the economy.(1)

4. Specialized Manpower needs of provinces are not well served by graduate training, in view of the low retention rate of Ph.D's within provinces where graduate degrees are obtained, with the possible exception of Ontario.(2)

There are, to be sure, other economic factors, but those enumerated should suffice to indicate the main trends.

2. Political Constraints.

The political incentives to greater sharing of university resources may be said to emanate in part from the economic constraints, but also from a political ideology of egalitarianism, which is relatively new to to Canadian institutions of higher learning.(3) Therefore, with the adoption of an ideology of democratization of access to higher education it is natural that we have come to adopt the ideal of liberalizing access to the contents of libraries, or, as part of a general trend to "democratization of information."(4) The shift of Canadian universities from elite to mass-style has been accompanied by an appropriate shift to public funding as the almost sole source of support, with the consequential rise in the demand for public "accountability," if not direct governmental control.

3. The Contemporary Communication Demands of Scholarship and Research.

The Canadian case has been well documented in a series of well-known studies and reports issued by the Science Council of Canada.(5) To generalize some of the import of these reports, it is said that research, especially in the physical sciences, but also in the social sciences, requires a national system for the dissemination of accurate,

comprehensive, and timely information, and that libraries have a strong role to play in the process of information transfer as nodes, or switching centres, in a national network of libraries and information centres. Prior to the Science Council reports, there had occurred a succession of library surveys which unanimously reported that Canadian libraries were understocked to serve the information and resource needs of scholarship and research.(6) Furthermore, the present level of world research is said to have generated an information "explosion," which libraries can no longer control by traditional or individualistic methods.

Critique of the Incentives to Rationalization.

Whereas it is always sound policy for public service organizations to find ways to provide the same level of services at less cost, by whatever arrangements feasible, the question of the economic productivity of higher education has perhaps a deeper significance. John Porter(7) has noted the "ambivalence" of Canadians toward higher education, and that Canadian universities have undergone the shift from elite to mass-style institutions with reluctance. Conservativism, traditionalism and a value preference for the rural are dominating attitudes of Canadian life.(8) The egalitarian approach to higher education, however, leads to social change and the establishment of a value-system oriented towards the urban way of life. In fact, there can be no economic justification for egalitarian higher education without acceptance of the urban value system which will be its outcome.(9) The outstanding examples of a policy of expanding higher education while maintaining traditional institutions as inflexible, are the developing countries, which produce trained manpower for which there is no employment and population densities which cannot be incorporated into the productive sectors of urban society. The educational policy may be meritocratic, while the social reward system can remain elitist or even nepotistic.(10) Not even the most advanced countries, in fact, are entirely free from the syndrome of institutional inertia which prohibits the release of the full social and economic benefits of education to society.

Therefore, the public concern about disequillibrium between rise of educational costs and rise of costs in the general economy is essentially misdirected.(11) The significance of higher education and research is not in the direct costs and benefits, but in what the economist calls "externalities." Externalities are the costs and benefits to which

society at large is subject, depending, however, upon the presence of appropriate institutional arrangements and capacities in society to "internalize" such benefits and costs.[12] In Canada, where provinces or regions have programmes of higher education but lack the institutions to internalize the benefits accruing to society, the consequence is that the benefits tend to accrue to special interest groups or to provinces and regions which are capable of this internalization. This, in part, explains why the retention of Ph.D's is relatively poor for all provinces except Ontario,[13] where urbanization is relatively high, and the resulting "tertiary" services and professions operate upon each other "synergistically," as it is sometimes called, to produce, in the aggregate, the higher-order services and benefits which are impossible for non-metropolitan areas to provide.

Therefore it seems clear from current research on demographic and urbanization patterns in Canada[14] that for those provinces which have not developed a positive and successful urban policy (as opposed to a policy of industrialization alone), their investment in higher education may well result, for them, in an externality far more of cost than of benefit. A national educational policy must therefore, be tied to a firm national urban policy. As for the prospects of an educational technology which will raise educational productivity to the level of industry, in terms of direct costs and benefits, this development seems unlikely, even though there are those who claim a new educational technology based on the computer will some day be practical. It is more likely that the meaningful component of the education process will remain on a person-to-person relationship, and hence labor-intensive and hence a rising-cost activity as compared with industry. The reason for this claim in terms of the significance of the interpersonal relation for individual and institutional productivity will be developed in sections to follow.

I would also like to question, or rather to qualify, the validity of the third incentive to rationalization, namely that the contemporary communication processes of research and scholarship have produced a flood of information over which the scholar has no control by current methods, and that a national information policy is mandatory to formalize scientific communication in a national system. It is clear that the growth rate of scientific literature is exponential, and defeats the capacity of indexing services to control and libraries and information centres to process and house. But on the other hand, I find it very exceptional to elicit from an academic scientist or scholar in any field the forthright admission that he has been hopelessly buried by the "information explosion," or that this fate even looms on the horizon. Derek De Sola Price has called our attention to the

fact that the vociferous complaints about control of science literature emanate not from scientists as such but rather from another breed, associated with industry, that is, the technologists who are always searching for an elusive product or process of manufacture. Price states: "For the most part, such literature crisis as is often discussed is an artificial construct on the part of technologists who believe there is some sort of useful scientific archive to which they have only a most difficult access. In fact the sort of material they want is not published at all."(15) D.M. Heaps (16) in a recent paper seems to discern a similar source for the primary impetus of the recent Science Council Studies and reports.

The reason, of course, that there is no actual literature crisis among scientists, is that the formalized channels of communication vested in indexes, abstracts, and libraries, do not exhaust the avenues of information available to them, but rather supplement the scholarly communication process which occurs over the interpersonal network for which Price coined the term "invisible college."(17) Scientists, however, will go along with the idea of a better formalization, perhaps for a reason not always overt -the problem of priority in reporting research results. If a new system of rapid formalization is introduced, which will give one's peers a competitive advantage in getting the archive legitimation for their discoveries, then one has no choice but to follow suit, even though this may be to the detriment of science in general, because of shortcutting or eliminating the processes of informal private colleagues, exchange among which serves as a positive influence for the improvement of quality of research through collaborative assessment, and also for the dismissal of the shoddy and poorly conceived, through the gatekeeper function of journal editors and the referee system.

What really seems to be the issue here is the relationship between scientific research and industrial and technological applications, and the government's role in implementing a policy for making the nation's scientific resources useful for industry.(18)

Of considerable implication for a public policy on information is the mounting evidence that the successful adoption and use of technological and scientific information is not at all related to a simple linear increase in the flow of formal information into firms, organizations, and universities, or even by improving the rationalization and comprehensiveness of this flow. Even though the flow of information may be improved and rationalized by such custom-tailored services as SDI (Selective Dissemination of Information), etc. the net result is often that the information is not productively used.(18a)

The reason for this state of affairs has been well researched and systematized at least since the early 1960's in the well-known studies on diffusion of innovation by such workers as Katz, Lazarsfeld, and Menzel,[18b] among others. The adoption of information or ideas for effective innovation is a two-step if not a multi-step process,[18c] in which the crucial variable is an individual within an organization who has sociometric centrality (i.e. an opinion-leader), and is able to mediate between outside sources of information and his own colleagues, in such a way as to make the new information meaningful and useable within the cognitive patterns which characterize the particular organization.[18d] That the personal mediation in the local social structure is a process applying to the adoption of new knowledge by special publics of scientists and technologists, as well as by general publics, for whom new information is communicated through mass media, then mediated for adoption by community opinion leaders, was one of the most important discoveries of information-diffusion studies.[18e]

Recent research on this theme suggests that the best way for a country to make use of information for technological development would be to finance and stimulate its natural human "mediators" to participate more widely in the international interpersonal network by doing research in foreign countries and maintaining personal contacts abroad.[18f] This viewpoint evokes the general theme of interpersonal competence in scientific and research organizations, and the viability and adaptability of social structures as the key to organizational productivity and innovation. This is a theme to which I shall return presently.

II. What Components of the Total Scholarly Communication Process are Susceptible to Rationalization?

1. Universities as Social Systems

Our topic is rationalization of libraries, and not rationalization of scholars, or universities. However, Guy Sylvestre, our National Librarian, as well as many others, has said that rationalization of university library functions must include "a parallel rationalization of higher studies and research."(19) Kenneth Hare has said that unless Canadian universities put their own houses in order, the state will do it for them.(20) If there are indeed strong pressures for such rationalization, then the administrators of libraries only need wait until universities organize themselves, voluntarily or involuntarily, in an appropriate hierarchy of responsibilities and specializations. However, the centralization of authority and allocation of responsibilities that this approach would entail would suggest that the universities would have to be run virtually as a department of the central government. The bureaucratic conception of the university is nothing unique, since it has been the continuing pattern in France. But the idea is alien to the Canadian Constitution and policy. Furthermore, the prospects for centralization are even less than before, in view of the so-called democratization if not radicalization of the universities, whereby universities are viewed as democratic communities and not centralized authority structures. The shared-authority approach is clearly on the rise.(21)

In general it would seem that the pluralistic(21a) nature of the North American University is such as to make a simplistic method of allocating fields, specialities, and areas of responsibility quite difficult. Also a point of considerable significance often overlooked by librarians who see no obstacle to a closer coordination among libraries, is the fact that each university has its own distinctive climate or "environmental press." It is thus necessary to study the total campus as a social system in order to determine what functional role the library plays within that distinctive setting. A sizeable body of research data has been compiled in the past 10 years, from such systemic studies of campus environments. A typical instrument is the EAT (Environmental Assessment Technique).(22) There are other methods for studying the characteristics of teaching departments, whereby it is possible to measure congruence with, or alienation from the overall campus press.(23) Such studies serve to dispel any notion of the

university as a simplistic decision model, with unitary aims and goals. For example, apart from the explicit function of the library as a place where books are kept, it has an implicit role-function in a complex social system. This social role will have much to do with its prospects of success or failure in participating in external networks of libraries, just as the social systems of individual universities may be congruent with some, and discrepant with other members in a university consortium. It is also far from sufficient to assume that the stated goals of the university represent operational objectives for which there is a consensus of the university's many subgroups. An apparent "goal displacement" will always appear when an organization's activities are compared with its stated goals.(24)

The latter furnish the normative perspective of broad cultural goals, which are non-operational, other than providing the justification for a large income, prestige and security. A fact often overlooked by administrators who would rationalize and reform along lines conducing to efficiency, is that a large proportion of the resources recruited to an organization cannot be productive in an operational sense, but serve for the sheer survival of the organization as a social system.(24a) To the efficiency expert, this situation appears as wastefulness or a misallocation of resources, when in reality these "fat" areas provide a buffer zone between conflicting subgroups, the library often being a case in point. The university as a social system, therefore, will display not a unitary set of goals and activities, but rather a range with both consensus and conflict from which, at best, a federation emerges, structured on a dominating "press" or academic life style.

In the context of the university environment as a complex social system, where resources are often deployed in seemingly casual and conflicting ways, it is instructive to view the advent of computers on campus, as tools for the tabulation and recording of management information. Systems analysts and computer center managers have taken the position that the introduction of computers does not need to upset organizational equilibria, but can in fact aid in providing more accurate data to administrators and teaching departments alike, on which they can base more secure and valid decisions. As it works out in practice, however, the introduction of computer management information systems results in a redistribution of power towards more centralized control. Even though everyone on campus has theoretically equal access to computer-information services, in practice it will be

dominated by those who run the computer installation. This administrative group alone can monitor and integrate information on the total picture.(25)

The disruptive effect of computer-based management information systems on the role of the departmental chairmanship has been recently documented.(26) The extent to which this new technique of administrative data control may have contributed to the rise of the student power and faculty power movements can be conjectured. The point here is not that the new machines are bad per se. The point is rather that failure to study the environment, where new methods are to be applied, as a total social system will result in "unforseen" consequences. A systems analysis of the industrial-engineering type is not a satisfactory instrument to study an environment as complex as the University. There must be a study of the total environment as a social system before effective planning can be implemented. The relevance of these observations for library planning as well will be readily evident.

It is not, however, my purpose to discredit the systems-analytic approach as an aid to planned innovation. The contribution of the techniques of operations research, linear programming, simulation models, and the like, is uncontestable. These methods provide hard data where before there was only speculation. But it is important to stress that a social system does not live by data management alone. Universities and academic libraries, by and large, still lack a genuine systems approach to planning. If "binary thinking" and flow charting is our sole approach to university planning and library planning, the result will be a centralized formalism which the majority of the subgroups of the organization will repudiate, and social and institutional change will indeed ensue, but most often of a destructive kind, such as crippling polarizations rather than a better accommodation of conflicting subgroups.

The discussion up to now was intended to illuminate the complexity of universities as social systems, and thereby to suggest the reason for failure of planning according to the simplifying techniques of operations research. But whereas the problem is complex, it is not impossible. I described briefly several other techniques which have the merit of treating the salient social as well as process variables, while at the same time retaining objectivity. It is important that librarians as well as university administrators be aware of the full array of systems design and study techniques and also recognize their individual limitations.

2. Knowledge and Universities.

If we accept the premise that the function of universities is to create, preserve, and transmit knowledge for the benefit of society at large (however we choose to define "benefits"), it follows that a successful approach to rationalization must include due regard for the processes of research and knowledge transmission, the nature of the institutionalization of knowledge-transfer in universities, and the archive function of libraries.

There is a tendency abroad, especially in this age of data processing, to regard knowledge as a product, which can be suitably weighed, packaged, and fed to the consumer. From the point of view of knowledge-production as a quantitative or measurable output, Derek De Sola Price has come up with some fascinating statistical regularities.(27) In addition to his well-known studies of scientific writing through citation networks, he has found a striking correspondence of a country's scientific output with its Gross National Product (GNP). For example, the U.S., which in 1964 had about 30% of the world's GNP also produced the same share of the world's scientific literature. Canada's share was in the range of 2%. India made a similar contribution as Canada. The case of India and Canada belies the possibility that the relationship would be based on population, since India's population is 25 times greater than Canada.

It is important to stress that Price has discovered a factor of correlation, not of cause and effect. It is not possible to say either that GNP causes scientific productivity or that scientific research causes GNP. It is only proven that they are related variables.

Resnikoff and Dolby(28) have applied this same technique to the study of the production of knowledge in all fields, as attested by the country-by-country holdings of the Library of Congress. Again, the same general statistical regularities were discovered to apply. This is especially surprising in view of the use at LC of many and diverse mechanisms for the acquisitions of foreign materials. Biases are in fact formally introduced by the corps of book selection officers, exercizing different tactics and methods of coverage. When Resnikoff & Dolby studied a much smaller collection in a university library in the same way, they found that this proportional relationship still held. Inference no. 1 is that not only scientific research, but all kinds of scholarly production are related to a country's GNP. Inference no. 2 is an uncomfortable one for librarians. It appears that despite formal selection policies, a general research library may function

only as a random sampling device.

I would now like to challenge the validity of the approach to knowledge as a product at the level of its creation and transmission. When we use such expressions as "information explosion" and "information storage and retrieval", we enter a dangerous and ambiguous realm of semantics. Librarians tend to get in the habit of thinking of information as a physical entity, or product, which is moved like an object from place to place, from channel to channel, from mind to mind. In doing this we are in effect confusing data with information or knowledge. In reality, there is no information, in the cognitive sense, which is transmitted over any channel. In reality there is no "information" to be found in information retrieval systems, card catalogues, or even in books. These contain only marks and symbols. This is a point that the communications expert, Fairthorne, has been stressing for years, to little avail.(28a) Cognitive information, or knowledge, does not exist except as a subjective state in the mind of the individual. Information is thus a space-time-person related process, not a disposable product. Another way of expressing the same idea is to say that the content of a message depends on the context, the context consisting of the nature of the source, the perceptual attributes or cognitive state of the receiver, and the opportunity or lack of it, for the source and the receiver to redefine and qualify the context through mutual interaction. Klaus Krippendorff states: "Since messages can be viewed from an indefinitely large number of legitimate perspectives, unqualified references to THE content of documents, ... or texts ... are unacceptable. Content evolves ... in a particular situation and for a particular ... purpose.(29)

It follows therefore that content analysis (or if you prefer, the assignment of classifications and subject headings) is not a formal process of derivation, because natural language, on which content analysis is based, has to date yielded to psycholinguistic research no algorithmic protocol which will equate formations in language to unequivocal perceptions or concept-formations.(30) Laurence B. Heilprin reminds us that objective proof in science, or validation in any field of knowledge, is a social operation in which subjective experience is translated into successive approximations in language until there is a failure to observe a "communicated difference."(31) Objectifying knowledge depends upon a consistency of interaction among the members of a field in which all members subscribe to the same norms of discourse. The validation of knowledge is a social process, based on a time-limited consensus which can be broken by any member who feels impelled to do so, and provided he can get away with it in the

constraints of the system of social sanctions and rewards which govern,and legitimate all fields of study. Objectivity can therefore be called a systematic mythology.(32)

These problems underline the condition that the knowledge enterprise is a heuristic process in which subjective impressions are haphazardly exchanged in social acts based on a precarious consensus of procedure and method. I draw two important inferences from this state of affairs, of direct relevance for libraries:

1. The communication of knowledge is operationally inseparable from its creation, and
2. The degree of standardization in a natural language communication format is inversely related to its power to encode new information.

Karl Deutsch(33) has formulated the complex of problems associated with information coding quite succinctly: "... the functional requirements of wide standardization and of rapid-and of possibly creative- innovation are opposed, at least in the short run."..And " ... genuine substantive innovation in any field of the sciences or letters may likewise tend to promote innovations in information coding with an uneven or discontinuous diffusion among potential users."(34)

For the world of learning this means the further differentiation of knowledge is continuous, although a new differentiation can itself represent a reintegration of two or more previously differentiated areas. And future differentiations, if successful that is - if they receive a sufficiently high degree of legitimation through a consensus of members - will be institutionalized in academic programmes.

Therefore, the organization of knowledge is represented by a range of data coding devices, encompassing at one extreme, library cataloguing and classification systems, and at the other extreme the internal code, or jargon, of an expanding frontier of knowledge. The former represents an extremity of formalism, of zero utility for the creation or transmission of new knowledge, and is a standardized translation code designed for the convenience of the broadest, possible public. The latter, being a provisional theory or model, is a conceptually heuristic mode of data organization, which may be as productive of errors as of valid insights. If the theory proves successful in communicating an internal consensus among the front-runners in the field, then effort will probably be made to formalize the conception in successively more standardized languages for larger and larger publics,

until it finally appears in the library-archive as a physical product in book or journal form. It will be inferred that the use of internal codes, jargons, informal interpersonal styles, or simply "half-baked" ideas, are a necessary condition of innovation and research. Somewhere between the extreme formalism of library catalogues representing the contents of published research, and the extreme informalism and heuristics of "research in progress," lies the controversial area of "information storage and retrieval." This remains a problematic area in the control of natural language texts for the reason already enumerated: that there are no (so far) information algorithms capable of being extracted from linguistic texts. Therefore, no matter how much "depth" is used in content analysis, or how rapidly and interchangeably you can manipulate these artificial data components on a machine, the output useful for new knowledge will always be limited by the degree of standardization. There are severe economic constraints on how relevant a system can be for a specific purpose, and yet balance with a level of standardization appropriate for more general purposes. As there is an inverse relationship between formalization for general use and relevance for specific use in information systems, they must always be designed in view of the major objectives of those who will use them.

Therefore we must anticipate that the very process of advancement and differentiation of knowledge, in all fields, will constantly generate information areas which are perceived as "out of control" to those who are outside the specialized grapevines, and these latter people may well get impatient and demand more and faster "formalization" and "rationalization," to make the content of research more widely available. However, it is obvious from an examination of the knowledge-creation process, that much of this demand is "irrational" in the sense that premature formalization would impair the creative process itself.

If what we hypothesize about the production and organization of knowledge is true, then it should have predictable correlations in the actual behavior of scientists and scholars. This is indeed the case. Price has applied the concept of "invisible colleges" to the informal communication network among the elite scholars, who are the productive and dominating influences in a field.(35) The validity of this concept has been given added weight and generality in more recent studies.(36,37) One of the consequences of this informal system, which appears to apply in large measure to all fields (humanities, social science, physical sciences) is that the creative communication processes have all occurred before the work finds its expression in print. This is reinforced by research which demonstrates that very productive scholars do not use impersonal sources

of information (eg. libraries) any more than non-productive scholars. The significant variable in scholarly productivity appears to be "not so much the total information consumed by the individual ... but rather (his) integration within interpersonal communication channels." (37) Hagstrom, studying the behavior of scientists finds that some of the most important research is carried out in the complete absence of the reading of books and journals.(38) When social scientists tackle the "big" interdisciplinary project, requiring information resources from many fields of knowledge, the standard procedure is not a massive trip to the library, but rather a conference to which resource people in different fields are brought together to have a big pow-wow.(39) The interpersonal interaction so provided does much more than generate raw data and strings of bibliographic references. It produces instantaneous feedback, methodological or know-how information not represented in the published media, and the rapid consideration, evaluation and selection of alternative strategies and solutions, which would take man-years of labor to assemble from published accounts. Philip Abelson has said "In view of the many strengths of this (human) information network, computer technology (and we might add, library technology) has far to go to match it in effectiveness and especially in cost."(40)

That a similar pattern applies even among the humanities is the import of a study by Robert H. Knapp on the origins of American humanistic scholars.(41) His assessment is that the humanities by and large lack the agreed upon standards of proof and disproof common to the sciences, but that an elite of highly intercommunicating humanists create the styles and norms of productivity for each field.

We might generalize by saying that a system of behavioral norms, prescribed and maintained by an elite group intensively interacting on an interpersonal level, is common to all fields of knowledge, and that this system legitimizes the contributions of its members to the common enterprise.

3. The Academic Scene and Libraries

The democratization of higher education and the growth of publication appears to be experienced by libraries in pressures such as service overloads, processing arrearages, or simply as incapacity to supply clients with the documents needed at the time required.

Internally, libraries experience these external forces in terms of increased organizational complexity, intra-organizational communication conflict and breakdown, exponential growth of supporting staff as a function of growth in size of collections, with a consequent rise in unit costs of production. Library costs, in fact, seem to be rising even more rapidly than university costs as a whole. Keyes D. Metcalf has confronted this problem, which was becoming highly visible at Harvard already in 1955. He states: "Our libraries grow continually, and I am not saying that they ought not to. In my opinion, however, neither our student bodies nor our total institutional budgets can grow at this same rate indefinitely. Hence the time will come when our libraries grow at a more rapid rate than our universities as a whole. They will then demand a larger and larger percentage of the total university budget; the only alternative will be to reduce the quality of library collections and services ... or to discover some other means of reducing expenditures."(42)

At MIT libraries, where a programmed budget system has been instituted, library costs, as reported by William N. Locke,(43) have been rising at 10% a year as compared with 5% for the university overall. Another study of the economics of the major private universities in the U.S. reports that per student costs rise at a rate of 7.5% per year, faculty salaries at 5%, and libraries at 15%.(44)

But even with significantly increasing financial inputs, academic libraries appear to be progressively unable to provide a service commensurate with the demands placed on them. Studies show that the chances are little better than 50% that the user will gain access to a particular item by means of a visit to the library, even if the item is officially held in the library's collections.(45) Functionally, therefore, the costs of library service are rising at an even greater rate than cost figures show, because libraries have been forced to hold down costs by passing some of the costs to the user. Thus it is found that the cost in time to a faculty member visiting the library may reach $9.00 before he has had any opportunity to gain any

benefits from his visit, as compared with a cost to the library in the range of 80¢ per circulation transaction.(46)

Finally, to summarize the economic plight of libraries, we may say that they are indeed acute, from the evidence that library costs appear to rise at at least twice the rate of the costs of higher education as a whole. This is doubtless a situation that cannot continue indefinitely, as the time is foreseeable when with rising unit costs being directly proportional to growth in size of collections, the absolute cost of libraries will be greater than all other university services combined. The crisis expresses itself most forcefully in economics. But the factors of a solution are far more complex than simply finding ways to reduce costs. To evaluate the library's position in the ebb and flow of the academic process, it is useful to look at it from 3 perspectives, which represent distinct system levels:

1. The Library within its own walls.
2. The Library within the University.
3. The Library among Libraries.

a. <u>The Library Within its Own Walls</u>

Organizationally, the library within its own walls has been thought of, traditionally and unconsciously even today, as a bureaucracy of the classical Weberian type. That is to say, on the organization charts it looks like a pyramidal authority structure, with successive levels of delegation, and exact specification of the roles and functions of each of its members. From the era of Frederick Winslow Taylor and so-called "Scientific Management" it received a further impetus to specify precisely the logical sequence of the tasks to be performed and the maximization of unit productivity, through work simplification, task differentiation, etc. From this view, the library is a production-control organization, analogous to the popular notion of a factory. The reward system which induces workers to perform in this environment is extrinsic, i.e., wages.

That the actual behavior of people in organizations does not fit the prescription has not attracted too much attention, except in industry, where the market principle and the labor union principle are somewhat more ruthless critics of performance.

The academic library, like the university of which it is a part, is also a social system, in which all its members participate in exerting a certain power or influence, and through various informal face-to-face networks representing partly conflicting, partly consensual interest groups, affect the operational outcomes, in terms of goal preferences and priorities.

The recent advent of the systems approach in library management, as the usual accompaniment to automation programs, comes in the guise of a new scientism, but is in reality the old command-control theory of organization with a new vocabulary and some new equipment.(47) The systems librarian typically uses a term of opprobrium, such as "humanist," to describe his old-fashioned colleagues who are unable to cope with the sophisticated quantitative techniques of the new management science. The criticism, I think, really appropriate to the old-fashioned librarian is rather the opposite. He has usually not been "humanist enough" to lead his organization successfully. The pervasive mechanistic ideology of how organizations operate is so deep-seated in our culture, that they emerge unconsciously almost anywhere public institutions are established. That the behavior of people in organizations has never fit this prescriptive model seems never to have bothered anyone except social psychologists and sociologists. And it doesn't bother the new systems analyst who is busy concocting his elegant diagrams of optimal flows of resource inputs and product outputs. The point is that despite the gleam of scientism, systems engineering is not a science, it is still the old normative prescription of how an organization "ought" to work, provided only that people perform their duties as automatons dedicated to predefined tasks. In practice people don't do what they "ought" to do, either in organizations or elsewhere.

However, human behavior under various organizationally imposed constraints is largely predictable as integrative or alienative, and hence productive or non-productive. This is where the real management science enters. The true task of management is not to build a perfect control system of dedicated, specialized human and machine components, but rather to develop a team of workers with what Chris Argyris calls "interpersonal competency."(48) The true costs of innovation are not in the design of an ideal structure, but in the time required to build a group of workers who can interact flexibly with each other, and have the confidence in the stability of the group to take risks in creative problem-solving. The inevitable failure of top-down, cost-control efficiency programmes, with overspecification of resources and quotas of output are well documented in the literature for industry.(49) They are less noticeable in public institutions because in those cases there is no market mechanism to tell you that you have gone broke or bankrupt. Recent studies give some idea of the massive investments of human and material resources needed for

successful innovation.[50] Indeed systems analysts play an important role in designing innovation, but the crucial factor in building innovation is the enlistment of staff participation from the bottom up. It cannot be imposed from above. It is therefore not a question of whether administrators will allow lower levels of staff to participate and contribute to organizational change. It is rather a question of how. Where the new system is imposed from above, the staff, from a sense of alienation, may participate in the collapse of the new system. After a massive systems failure, an organization is characteristically found to have a "personnel" problem.[51] The time required for rebuilding a new staff with adaptiveness, and the capacity to work together effectively, is the true cost of the innovation which failed. The main point here is the often ignored complexity of libraries as social systems, and that productivity and innovative achievement are far more complicated than a simple definition of the optimum resource-mix and optimum output. The goals, in short, pursued by the library will be mediated and negotiated, through multiple interpersonal relationships internal to the organization, and these will severely affect the capacity of the organization to pursue externally defined objectives. The first problem for rationalization among libraries is the development of the capacity for change and rebuilding the integrity of the internal organization of any particular library.[51a] The integrity and adaptability to innovative behavior will in large measure depend on the diffusiveness, as opposed to rigidities, of the implicit social reward system in an organization. The extrinsic reward system (salary) is not as accurate a predictor of organizational flexibility as the intrinsic and informal reward system.[52]

b. The Library Within the University

From the production-control point of view, it is easy to arrive at a simplistic notion of the library's function on the campus. The simplistic conception asserts that the library's function is to supply books and materials needed by faculty and students and aid accessibility by means of appropriate bibliographic and reference services. From the systems engineering point of view it is only necessary to identify the coefficients which will maximize user-accessibility through the optimum provision of library resources. This approach would result in a search to optimize among two alternatives: Anticipative services and Reactive services.(53) No library can afford to anticipate all user needs by acquisition in advance, as this would imply the inclusion in one collection of the whole bibliographic universe, of which no library in existence holds much more than a 1% sample. Blanket orders, subscriptions, en bloc purchase are examples of anticipative collection building. Neither can a library rely entirely on the reactive method, such as recourse to interlibrary loans or demand purchase ex post facto to all requests. Every library needs immediately at hand a basic collection for all fields for which the university has programmes, and very likely for "interstitial" areas as well.

What users "need" is the really problematic area for definition. There is of course latent need as well as manifest need. There is now sufficient evidence to ascribe some doubt to the assumption that the scholar's manifest need as represented by his book selectio practices is an accurate predictor of his own (as well as anyone elses') actual use of library materials.(54) As much as twenty-five per-cent of a university library collection may only be used once in thirty-five years.(55) There is a general rule from inventory theory which is found to be entirely valid for library collections, which states that at any given time 80% of use is provided by 20% of the stock. Furthermore, past book-use patterns are better predictors, in the aggregate, of future use than the expert opinion of scholars.(56) Fairly simple and objective statistical sampling methods are available to determine what materials a library needs to retain for the immediate use of faculty and students, and what materials it needs only infrequently to access through interlibrary loan or through cooperative programmes in consortia.

However, the technical or production system is only one component of a social system.

As a component of a complex social system, a library's performance

will never be evaluated in terms of its production systems alone. Library users are a heterogeneous lot, displaying many different behavioral styles. But libraries are also evaluated by funders, sponsors, and larger publics, and of course evaluation is an emergent function of the organizational priorities practiced implicitly as well as explicitly by the library organization itself. Evaluation of organizational performance is always a time-person-space related process.(57) As all evaluation is relative, it is important to be able to identify as many of the salient factors as possible within the community from which library expectations as well as evaluations will emanate. To differentiate library services in the conventional explicit sense from functions at the occult or extra-informational level, we might use the term "latent library functions." Among these functions, I would select the following types as examples:

Library as Monument.
Library as Archive for the recognition ritual of scholarly attribution.
Library as Buffer Zone, or Scapegoat, for conflicting campus interest groups.
Library as occupational disease of some teaching departments.

There are many others, of course. The use of the library by students as a place to meet friends, come out of the cold, or sleep does not yet exhaust the possibilities. I shall take only a few of these topics for further elaboration.

The library as monument evokes the tired old image of "the heart of the campus." If the library is placed physically in the centre of the campus, then all arteries and veins of traffic will indeed lead to and from the library. But more importantly, as a monument, the library is a point of reference for the university's broad-sweeping cultural objectives. These objectives are non-operational, and yet have an essential function in evoking the ideology around which the university can legitimate its claims on society for large incomes in order to finance its specific teaching and research programmes. All cultural institutions have to legitimate themselves in society by espousing the broad cultural norms of the nation and the human race. The actual implementation of them is of course impossible, because if they were to be implemented, the institution would have no reason to exist. The symbolical functions allotted to the library in this ideological process will vary from institution to institution, but it is clear that they will impose a further qualification on the conception

of the library as a functional system only, and such "irrational" functions also have an impact on the library's freedom to participate in collective enterprises of rationalization.

Library as Archive for the Recognition Ritual of Scholarly Attribution. Librarians, in order to recruit or maintain external support for their programmes, report circulation and other use statistics as evidence of use of collections, under the assumption the more books people are reading, the more educated they become, and the more they will tend to achieve the broad goals of the university for the benefit of society. However, from the viewpoint of learning efficiency, the ideal would not be to maximize the reading of books, but rather to maximize the learning process with the least necessary recourse to reading and any other information sources. Research on the differential productivity of scholars has shown that productive scholars do not use impersonal information sources any more frequently than non-productive scholars.(58) The significant variable for productivity is the level of a given scholar's participation in that interpersonal network called the invisible college, which beats all other channels for economy, speed, and the validation of the germ of a new idea. There is evidence that this human network is the central factor of production in the case of the humanities, as well as for the physical and social sciences.(59)

If this is so, then we must question the validity of the whole concern of scholars with libraries. It is appropriate indeed to ask such questions, inasmuch as the main pressures for augmenting the size of library holdings come from graduate and research programmes.

Taking what is known and generalizeable of the scholarly research process, we might make the following hypotheses:

1. Relatively unproductive scholars use libraries more than they use the more efficient interpersonal networks for validating information sources and ideas, and therefore work at a disadvantage compared with their more productive counterparts.

2. Relatively unproductive scholars use libraries more than they use the invisible college because they must, inasmuch as they have been unable to gain entry to this communicating elite. This category might include relatively more graduate students, for example.

3. Relatively unproductive scholars have a different set of motives or priorities in conducting research, as compared with their more productive counterparts. Or, in other words, some scholars are doing research

without the expectation of gaining admission to the communicating elite of their fields. Some may be "loners," who reject the fashions of the time.

5. The library collections have some other function or value for scholars than that of supplying the materials of information and research.

None of these hypotheses, in fact, is entirely unsupported by the evidence from the research on research to date. It appears that more research is needed to clarify the multiplicity of variables involved and their relationships. Certain of them in fact have a validating feature in another kind of research. There is some evidence that the relatively productive as opposed to the relatively unproductive scholar is actually a feature of an organizational typology characterizing teaching departments in general. The sociologist Alvin Gouldner has usefully applied R.K.Merton's cosmopolitan/local typology of community influentials to the academic setting.(60) Oversimplifying this view, we can say that teaching departments may consist of a stable corps of "locals," who have made the department their permanent home, and are more oriented to administrative, maintenance, and teaching tasks for their own institution. The "cosmopolitan," on the other hand, is oriented to participation in the international elite world of front-line scholarship and research, is little concerned with local affairs, and is highly mobile.

However, it would be an injustice to say that the local-oriented faculty members have the mere function of holding a department together, so that a cosmopolitan star has some place to hang his hat, while making his unique contributions to human knowledge. This would indeed be the case for the typological extremes. The pure cosmopolitan is never integrated either into the formal or informal social systems of the local department, but is always outside-oriented. But in order to build a productive and innovative research and teaching organization, locals, cosmopolitans, and also "mixed types" are required.

The mixed type has a role of centrality in the teaching and research productivity of the whole organization. He must be oriented to the local institution, and have "sociometric centrality" in both the formal and informal structure of the organization, but also have sufficient contact with the international scene in order to perform as the mediating agent filtering new ideas and information into the organization in a form which can be accepted and adopted by his local colleagues. The "pure" cosmopolitan, although having the knowledge, is unable to perform this function in a local

environment because his position is marginal to both its formal and informal communication structures.(60a)

However, the real contribution of Gouldner's analysis is the discovery of latent social roles as complementary to the manifest ones. The manifest organizational roles are institutionalized in the familiar divisions of labor and official titles and ranks. However, the manifest functions will explain little about differential performance and productivity of either organizations or the individuals within them. The elucidation of latent roles, on the other hand, provides an analytical framework for describing how the work of organizations actually gets done, and above all, provides a typology of how organizations of one kind orient themselves behaviorally to other kinds of organizations.

The different scholarly styles of teaching departments and individual scholars will have correlations in significantly different library expectation and use. We would anticipate that the configurations of different universities on the cosmopolitan-local scale in conjunction with their distinctive environmental press will be significant variables in determining the differential orientations of users towards libraries.

Thus libraries as well as scholars have inexplicit or "latent" functional roles. Further evidence for this is to be found in studies of how the norms of citation behavior and other normative criteria for the presentation of research are found to be related to the reward systems operative in various fields of knowledge. Storer and Parsons (61) identify three essential norms common to all fields of scholarship: (1) Objectivity, which is a protocol of procedures for reaching a consensus among the members of a field(62) (2) Communality, which is the norm of sharing information, or making it public property (3) Disinterestedness, or requiring that the scholar deny his personal interest in the outcome of his research. Robert K. Merton(63) and others have hypothesized that the slender thread on which hangs a personal dedication to research is the recognition ritual of scholarship. The recognition ritual operates through the norms of citation behavior,(64) which vary considerably from one discipline to another. Credit or recognition is allocated to a scholar for his contribution when members of his peer-group honor him by citing his name in the formal publication process. This formal attribution procedure by the peer group membership appears to be the primary motivation to a selfless life of research.

The point has sometimes been made that in formal publication so few citations are habitually made of preprints and informal communications that the significance of the invisible college idea might be overrated.(65) I tend to think the opposite. That published works primarily cite other published works supports especially the view that journal and book publication is not concerned with the communication process as such, but with the official attribution ritual. Everyone in the field who is anyone knows what everyone else has been doing for the last 5 years prior to formal publication.(66) But the formal ceremony of reading one's credits into the historical archive must be upheld, this being the permanent record and documentation of one's immortal contribution to knowledge.(66a)

It follows then that, among other reasons, scholars will maintain an anxiety about libraries, not always expressly focussed, which at heart resembles a concern about whether one's niche in the ancestral burial place is suitably provided for, and this concern will vary as a function of the individual's locus on the cosmopolitan-local scale and his current "visibility" in his invisible college and other reference groups. This provision of course requires the presence of the whole line of one's scholarly antecedents, and the whole citation network in books and journals, through which the genealogical succession can be traced to oneself. Part of the socialization of a graduate student into a field of learning, especially in the humanities, involves on internalization of the norms of the "archive mythology," and he must accustom himself to feeling spiritually "at home" in this genealogical archive, even if he seldom reads in it.

These are a few examples of the latency functions of libraries, which should suffice to underline some of the complexities not usually considered in questions of rationalization of libraries within the university community. To regard the library as simply a storehouse of information, therefore, is by no means the complete story.

c. The Library Among Libraries

The preceding discussion has acknowledged the wide application of a method called Systems analysis to the task of rationalizing library functions at the level of the library within its own walls, and also at the level of the library within its university setting. The shortcomings of this method were also noted, and some suggestion was made concerning the need to formulate the systems design at a higher level, in order to include a valid mode of description of all the major functional variables mutually operative at each level of generality.

The same conceptual approach is now recommended for an assessment of the prospects of rationality at the inter-institutional level and up to the level of a national system.

By this approach we would not begin with a national design and attempt to make local units comply with the system's demands. We would rather begin with a local situation, and attempt at each decision point to widen the available options for the next higher level of interaction and integration. The system developing in this manner would be built on the consensus of each preceding level of integrative structure, which would involve the participation of the universities as totalities, not libraries alone. The system finally arising at the national level would be an emergent network rather than a prescriptive one. In this way the participating organizations would, through the experience of building from within, attain a high level of adaptability and discovery of new options, rather than the constriction of opportunities which would follow from the formal adoption of a ready-made design. In the growth of new social systems, the local and collective learning experience is of more importance for the future adaptability to the inevitable and unforeseen new problems than the speedy achievement of an ideal plan.(67)

Feasibility systems studies on library networking at various regional levels are being generated at a great rate today, and especially in the U.S. Most of them have the tragic flaw that while they are elegant engineering designs, they ignore a consideration of how human beings behave and adapt to organizational change. All systems which depend on people for their operation are implicitly relying on a process of human behavior modification to attain implementation. The process of modifying human behavior is not achieved by drawing flow charts, although this may well be useful. It requires the

participation of people at all stages in the formulation of objectives, in the heuristic search for feasible solutions, in the development of the plan, and finally in the implementation. For example, it may be feasible from a systems point of view and compelling for the theoretical economies involved, that academic libraries at the provincial level should develop a centralized processing centre, built around a common computer and software installation, handling acquisitions and cataloguing of all standard publications according to a standardized format. By pooling expensive and scarce resources, this may be one of the best ways to exact true economies of scale from computer facilities for libraries. The feasibility study may show that the unit processing costs will be reduced significantly for each participating library.(67b) However, stress is likely to arise when the member institutions, for seemingly petty reasons, reject the processing centre's output. The processing Centre managers will then rail at the fustiness of hide-bound librarians or the orneriness of human nature. The moral of the story is that if your system at any point depends on the judgment and actions of people, these must be built <u>with</u> the system not out of it. For every case where you can find a cooperative programme of this sort being initiated, you can probably find another whose members are triumphantly proclaiming their newly won independence.

Another useful way to conceptualize the problems of creating a more productive inter-organizational structure is to make use of the exchange model of communication and power, which has proven to be of virtually universal validity for illuminating social interactional processes.(68) Exchange, in a generalized sense, refers to a transaction of any kind among actors or subsystems. The objects of exchange can be messages, materials, or as characteristic of some cultures, women, in the institution of "bride price."(69) An essential norm of all social exchange processes is <u>reciprocity</u>.(69a) "By analyzing exchange patterns among actors or subsystems, it is possible to predict the changes likely to occur both in communication channels and in power relationships."(70) In this view, power and influence become circulating media of exchange, like money. If the flow of transactions is equal between participants, power is diffused, this state being characteristic of the popular notion of "democratic" institutions. If the flow of transactions is structured on a unidirectional basis, an imbalance ensues in which low producers of transactions become progressively more obligated to the high producers, and this results in a localization of power and stratification in new hierarchical-type structures. As the asymetrism of communication flow imposed by a new interinstitutional arrangement results in a new de facto stratification system which is usually incongruent with the manifest or

previously institutionalized structures, then stress will be experienced within the manifest or "statutory" institutions to such an extent that revolt or escape from the new arrangement may be the outcome. It will be readily seen that one of the major defects of the systems-analytic approach, in the common meaning of this method, which is to construct a logical command-control sequence from input to output, is unidirectional in its conception of transaction flows, despite the provision for a negative "feedback" mechanism. It can therefore be predicted that the use of this method to organize linkages among complex institutions will result in much social stress, endangering even the survival of social systems, unless provision is made for a reasonable balance of transactional flows in all directions throughout the new systems. The implications of this theory are considerable for inter-institutional arrangements, in which the participating partners have unequal resources to contribute and who will transact at differential rates throughout the exchange system. The implications of asymmetrism in transactional rates in new interinstitutional library arrangements have hardly been touched upon if mentioned at all, in the literature of library "networking." In a simple dyadic relation in which one partner performs as communicator, the other as recipient, it is important to understand that the act of communication is synonymous with the allocation of influence, inasmuch as no communication takes place unless a change in the state of the receiver is induced. Since even with reciprocation the degree of influence is rarely equal, the asymmetrism thus introduced in transactions between the influencer and the influenced leads inevitably to new stratification systems in conflict with established systems. One of two reactions must ensue when new transactional arrangements have reallocated power and influence in a new latent hierarchy: (1) the new latent system can be legitimated in new institutionalized structures which supersede the old, or (2) traditional "autonomy" can be reasserted by withdrawal from participation in the new exchange system, or by reducing the level of participation to a tolerable threshold.(70a)

In a conjectural way, I would like to note the interesting parallel between the exchange theory of political power and the contemporary adaptations of central place theory in locational geography.(71) According to central place theory, urban centers of higher order functions progressively incorporate the lower order functions of the adjacent regions and municipalities, so that the latter fall under "economic shadow" and decay.(72) Thus as inequities in the transactions between city and region are established, a multiplier effect takes over which elevates the higher-order centre to a

metropolis while the surrounding region is reduced rapidly to a dependency on the urban complex.(72a)

This process of urbanization is so characteristic of Canada today that the 4th Review of the Economic Council of Canada stated that "By 1980 six out of ten (Canadian citizens) will be concentrated in 29 metropolitan areas... " (and) " the pace of urbanization in Canada will continue to be the highest among the major industrial countries in the world." (73)

The significance of the high rate of urbanization in Canada for higher education and research is commonly overlooked. If there is any validity in the assertion often heard that Canadian research is redundant and teaching is imitative of what is done elsewhere, and not contributive to the genuine national aspirations and needs(74) , then it would not appear entirely plausible that Canadian scholarship suffers from a lack of access to the world's information resources. To be sure, high correlations can be found between the high productivity of Ivy League institutions in the U.S. and the size of library holdings.(75) But in view of the fact that Ivy League institutions are eminently productive in the humanities,(76) as contrasted with the more information-and data-orientation of physical and social sciences, the significance of library holdings in this correlation may be the presence in Ivy League libraries of such rich holdings of original texts and source materials. The preponderance of the easily obtainable secondary and informational materials is characteristic of libraries recently emerging in support of advanced studies, this situation being characteristic of most Canadian academic libraries.(77) But still, for the highly productive elite institutions of the U.S., the correlation between faculty salary levels and productivity is higher still than the correlation with library resources. This fact is also congruent with the principle that a significant factor in the individual's productivity is participation in an informal interpersonal network and that a rich, heterogeneous environment would tend to promote a productive collaboration within a "community of scholars." This does not detract from the importance of libraries. In fact, I have expanded the conception of libraries to include significant latent social-role functions considerably beyond the customary ones. However, it is clear from history, if not from the present, that scholarly meccas arise not in rural areas but in cities. There is validity in the idea of a community of scholars in face-to-face interaction, and the physical opportunities for this can only be provided in metropolitan areas which combine economies of scale,

the higher order services and amenities, and where diverse talents and resources cooperate to produce a dynamic cultural and intellectual climate.(77a) The shift of Canadian economic life from primary and secondary industry to tertiary service industries is documented.(78) Federal and provincial urban policies have not yet caught up with these facts. The serious question yet to be resolved is whether the externalities of cost in urban agglomerations will be equal to or exceed the externalities of benefit, in which case the metropolis will fail to achieve its promise. The future of the university is synonymous with that of cities, and society's salvation appears to hang on what Daniel Bell has referred to as "... the transformation of the university into the primary institution of the emerging post-industrial society..." .(79) Whether this does indeed occur will depend on an acceptance by universities of a destiny in the very anatomy of emerging urban society. Therefore the question of the function of the academic libraries among other libraries is ultimately subsumed under the much larger problem of whether Canadian universities will orient themselves to a role of centrality, with innovative knowledge and communication functions as the central factor of production to transform the pending urban crisis into a viable pattern of existence. The adoption of interinstitutional linkages must always proceed with a view to increasing the resources for problem-solving at the community level. The problems of integration of knowledge-production and information systems in the pending crisis are far too complex, far too unique to time and place, and still at this stage unknown, to rely upon solutions designed exclusively at one level, either national, provincial, or local.

III. Review of Problem Areas of the Production Subsystem of Libraries and Considered Solutions.

I have placed a major stress, up to now, on the local constraints of interinstitutional rationalization. I have suggested that apart from the obligations a library may owe to its local community as laid down by explicit policy statements by university governing bodies, there are inexplicit functions, which, in the total social system of a university, may be equal to the explicit ones or even more important. I have also suggested methods of measuring and evaluating the whole range of functions that a library may perform within its community, and that the consequence of such studies may reveal unexpected opportunities as well as constraints on the possibilities of rationalization.

Therefore the first priority for a university contemplating rationalization at a higher level is "Know thyself." Because accurate descriptive knowledge of an organization is rare compared with the proliferation of normative, prescriptive, or idealistic statements, a great deal of work needs to be done in the area of "environmental assessment." Although some academicians may balk at the idea, it is essentially a study of how people behave collectively in a specific configuration of institutional norms, constraints, and opportunities.

But while the patterns of research and specific university social systems remain to be better assessed, a sizeable array of production-type problems confronting academic libraries in Canada and elsewhere is already fairly well defined. These include the following:

1. The inherent impossibility of any single library no matter how well financed, to acquire for itself anything approaching a complete collection of all the research materials that might be needed by users. (80)
2. The inherent impossibility, with the technology present and foreseeable, of relying on interinstitutional networking arrangements to provide anything approaching access to all the research materials that might be needed by the users.
3. Given a collection of a million volumes, and probably much less, the actual use of materials will be restricted to a much smaller fraction, and a large proportion of research collections may not be used in a hundred years.(81) For example, the typical library is able to satisfy 80% of demand from 20% of its book stock. According to the reports, the National Library is able to supply locations for 80% of requests not found in local libraries.(81a) This leaves, actually, a very small percentage of unsatisfied demand, perhaps in the range of 4 - 5 %. (81b)

4. The pressure on high-demand materials is such that the user has, statistically, a somewhat better than a 50% chance of gaining access to a desired item, at the time of a visit to the library, even if the item is officially in the library's holdings.(81c)

5. Whereas access to information in the sciences and social sciences is probably better provided for than some people would claim, the real problems of research collections are probably in the historical-humanistic fields, inasmuch as the need for humanists to use original texts and source materials is not supplanted by more recent accumulations of knowledge.

Certain inferences and considerations emerge from the foregoing statements:

1. Libraries with deficiencies of basic or core-use materials - (a core collection may well consist of as much as a million volumes, depending on the basic academic programmes pursued by the university)- will not be able to correct this situation by interinstitutional rationalization. Such deficiencies can only be corrected by increased support and better rationalization of individual libraries.

2. The concept of a distributive system of responsibility for specific fields among libraries, which collectively would approach "comprehensiveness" also has grave defects. Priestley(82) in his survey published in 1964, said that a "random accretion of specialties" would not create a proper library. It can also be said that a random distribution of inter-library specialties does not build a coherent national system. E.E. Williams, the Farmington plan expert and coordinator, has appeared recently as a critic of the programme in the U.S. He states that a centralized national lending library for specialized materials would be a better method and "justified by the fact that it would no longer be necessary to guess how a book had been classified for purposes of Farmington Plan allocation or to consult the National Union Catalogue to determine the location of recent foreign publications, and that centralization of responsibility should make possible better service (in cataloguing, in interlibrary lending, and in filming)than can be expected from 60 individual libraries, each of which has primary obligations to its own community."(83) In fact, because of the diverse and divergent policies of individual libraries, the Farmington Plan approach has been anything but a success in providing comprehensive access for all users to foreign publications. This situation is

in part related to the fact that cooperation in lending out of library materials is of necessity a relatively low priority of insitutions, whose obligations are first of all to their own community. However, a central lending library, set up to do only that function, can more efficiently get specialized materials into the hands of users, including even en-bloc lending and shipping arrangements, rather than individual titles only. The Farmington Plan has produced curious fragmented specialties in several university libraries, which have not acquired the geographically or historically related material, so as to be transformed into a collection scholars can use. It has been a blessing chiefly to those institutions which were individually embarking on large-scale area programmes in the first place, and through the system of Farmington Plan dealers, were able to supplement their sources of supply.

Therefore the idea of a Farmington Plan approach for Canada should be studied very thoughtfully before replicating the U.S. experience. Williams said in his survey of Canadian libraries of 1962(84) that Canada probably should not embark on a Farmington Plan at that time because libraries generally still lacked basic strength. This is probably still true, and will be especially the case for the numerous new universities and colleges being planned, although we hope for more clarification of the situation from the National Library's Office of Library Resources current survey. However, even assuming the current basic strength of Canadian libraries, the validity of rationalization through distributive responsibility is dubious, in view of the mobility of fields of knowledge as well as the mobility of the cosmopolitan scholar, who seems, generally, not to rank library resources very high among the factors motivating his decision to locate.(85)

3. Another consideration, at the aggregate level, is the question of what level of comprehensiveness in the possession of recorded documents of all kinds Canada really requires in libraries and archives. I have tried to summarize the research which shows that the basic thrust of research emanates from an international elite interacting frequently at the interpersonal level.

If the objective of higher education and research in Canada is to promote scholarly contributions at a competitive international standard, the evidence does not at all support a belief that Canada's 2% contribution to world research productivity would be increased by assuring that Canadian scholars read and regurgitate the other 98%.

Research productivity is based on a highly selective and economic process of elimination of the irrelevant much more than a comprehensive assimilation of the redundant.

As a further illustration of the equivocal relationship of the size of library holdings to scholarly productivity, a survey of Harvard tenured faculty in 1968 found that 65.7%, or approximately 2/3, did not assign libraries either to one of the three most attractive or three least attractive features of the Harvard environment.(86)

4. Another consideration is the "epistemological" discontinuity between a natural language text as a purveyor of data and as transmitter of information to the user. The term "control" in the expression "bibliographic control" is a relative, not an absolute, feature either of library catalogues or more sophisticated information-retrieval devices, which search by natural language text. Studies indicate that the preponderant use made of library card catalogues by users is for the specific document search, under a known author.(87)

The limitations in terms of use to the user of any method of language-processing for bibliographic control or information retrieval, whether manipulated manually, or by machine, should remind us to ponder what we really mean when we speak so optimistically about a comprehensive system, to control the transfer of bibliographic "information."

The utopian dream of global comprehensive bibliography has arisen many times throughout history. The failures before have not really been technological, but social - that is, related to certain ignored factors in the knowledge-creation process itself. The power of the computer seems again to offer the tidy prospect of having every piece of recorded information under unitary control - locally, regionally, nationally, and internationally. But even if it becomes technically feasible, is it desirable, or even useful? Other than for the esthetic urge of cataloguers to get everything on a 3 by 5 card, or its surrogate in machine-readable form, is it even necessary or useful to produce a national union catalogue which is truly "comprehensive" in a unitary system?

IV. Proposals for Further Study for the Optimization of the Production Subsystem of Libraries

Having reviewed the problems and prospects of various approaches and alternatives, I would like to submit several proposals which might be deserving of further inquiry. These proposals center mostly in possible services of the National Library, which can function as a stimulus and inspiration to nurture rationalization in the specific local context. (See also Appendix)

1. National Standardization for a machine-readable bibliographic data transmission format is indeed a high priority, to avoid the waste of resources which will result from any other course of action, as libraries individualistically create incompatible programmes. The National Library should function as the centre for this development.

2. The standardized machine-readable bibliographic data format should form the operational basis for the establishment and maintenance of a national union catalogue in machine-readable form.

3. In addition to providing a location device for copies of titles, the national union catalogue in machine-readable form should provide, as a by-product, a statistical service for management information, which may prove to be more important than all other services. The national union catalogue system, making use of the record-keeping powers of the computer, should be able to monitor the growth and development of libraries in Canada both individually and collectively. A statistical profile on the collections of each library could be maintained, and in conjunction with further statistical data generated by interlibrary loan requests and other transactions, the comparative effectiveness of each library in serving specific subject needs could be monitored, and remedies in acquisitions method could be instituted in specific cases, for uneven growth trends in individual collections, that otherwise might remain undetected for years. In other words, the national library could function, as it were, as a central acquisitions and circulation checkpoint for all transactions among libraries in Canada, as well as the transactions of the latter with the booktrade, and using the statistical-tabulating power of the computer, could in this way produce comparative effectiveness profiles for all libraries.(87a)

Interlibrary loan requests involving a given title above a predefined frequency would result in assigning that title automatically to the category of basic materials and hence recommended as an item for purchase for all libraries within a preselected programme profile.

4. If the previously described automated union catalogue services were now combined with an efficient reprography capability, we would then be well on the way to developing a mechanism which can truly rationalize the growth of collections. Whenever need becomes evident for materials unavailable or prohibitively scarce and expensive in the booktrade, and whose demand on interlibrary loan exceeds a certain frequency, the National Library would then take the initiative to locate and film the originals, and produce a negative master for such titles, from which libraries may secure either microform, or hard copy by copyflo reproduction. The negative masters would be preserved in the National Library as the growing embryo of a national preservation and dissemination programme. In time the national "microbank" would become the major collection resource of the country. As this system becomes ultimately combined with the automated union catalogue in some type of COM (Computer-output microfilm) system, university libraries would no longer need to be concerned either about the eventual deterioration of the major part of their collections in paper, or about gaps in specific subject areas, as with time more and more material could be replaced, or acquired in hard-copy form produced from the "microbank" in the National Library, immediately as needed. Inasmuch as new breakthroughs in high-speed reprography systems are imminent it may be anticipated that high reduction microforms might even become the standard original format for the transmission of scholarly materials, while optional use forms need not be printed out until needed.

Ultimately the problem of rationalizing library collections is a problem of rationalizing the publishing and book trade industries. If scholarly publishing can be encouraged to move in the direction of the COM method, then national libraries need only receive, according to depository law, a reduced-image version of the original, from which a full-size version would be "published" for other institutions or individuals as needed, either today or 100 years from today. To be sure, a new system of remunerating authors and publishers, based on some copy-fee principle, would have to be developed. At the same time there would probably remain a considerable publication and trade for letterpress texts of literary and esthetic works. However, the costly flood of unusual and unuseable materials now filling libraries could be avoided, by virtue of having it "on call" from the national centre, and internationally through other national centres, when needed.

Far from being a visionary dream of the future, this method is already feasible and the practical approach to the purchase of rarely used materials, which need not be in all collections, but which at some point in time, in an unpredictable location, will serve the need for a large-scale research project.

However, the central thesis of this paper is the necessity to reformulate the optimization process at the highest level of functional relevance, rather than the analytic separation and treatment of subsystem components only. It is a methodological error to assure that the social collectivity represented by the system of knowledge production, organization, and diffusion is simply the sum of its mechanical parts, which may be isolated for independent treatment. Therefore, the optimization of the production functions of libraries and publishing is not necessarily to enhance the total process of knowledge production and distribution. In fact, an isolated approach to subsystems rationalization may be positively detrimental to the larger social organization of learning and research. Therefore much more work on the productivity of learning and research in differential organizational and communication environments seems indicated before some of the newer technological capabilities should be applied wholesale in a possibly shortsighted rationalization effort. The final section will attempt to summarize the salient social factors which need to be included in a programme for rationalizing the production functions of formal information diffusion systems.

V. Discussion and Summary

To recapitulate, I have indicated a number of subsystems common to all social organizations, these consisting of production, managerial, integrative, supportive, adaptive, and pattern-maintenance subsystems, in accordance with the functional typologies of Parsons and others. I have intimated that librarians, in overstressing their production and managerial technologies in support of a utilitarian, goal-oriented service, to the neglect of other basic functions, may have lost an accurate perception of the library's full functional role in the larger social system of knowledge production and diffusion. Although the optimization of the inventory-control, data-management, and production-control subsystem is certainly a noble aspiration, subsystems optimization only will fail as a mechanism of inter-and intra-institutional integration, because the "latency" functions of specific social institutions, being local reflexes of functions in the larger systems environment, will ensure the failure of the simplistic approach to rationalize the manifest or production subsystems.

Librarians in trying to make themselves "useful," as befits the utilitarian ideology of our age, have perhaps misrepresented to their publics the utilitarian values of their stock in trade. To return to the notion of the library as a public monument or a shrine in this day and age is of course to invite the contempt of nearly everyone. But it is well known that it is precisely in those areas of society's greatest commitment to a widely sponsored rationale that some dark "idol" of venerable antiquity and irrationality usually resides. It is indeed possible that the perennially marginal position of the librarian vis à vis his client groups, despite great expenditure of effort to acquire academic or equal status, may simply devolve from the condition that society continues to assign to the librarian, in great measure, the role of a caretaker of a shrine rather than that of a dynamic purveyor of information in documents.

It is inevitable that the scholar's ambivalence(88) in his very dedication to the mutually conflicting institutional norms of his profession, will be transferred in his attitude toward the library. The institutional imperatives of research (objectivity, impartiality, disinterestedness, etc) do not permit the scholar to be overtly concerned with his own status in the social organization of scholarship, and yet this status, won or not won, through the recognition rite of the citation system is the only raison d'etre of the scholar's profound commitment to his work. No where is this raison d'etre of a life of research given institutional substantiation (and

sanctification) except in the formal publication ritual and the library archive. Hence the aptness of Price's phrase, "mythology of the archive,"(89) which is a useful concept under which to organize some of the library "latency" phenomena.

Libraries are different things to different people as well as different things to the same people. No one can deny that it is an information system and a very important component of the memory-store of society. But it also has an important function in the university environment as an articulating symbol, as the tangible reference point of the value system of "the examined life." Nothing else so well symbolizes the broad cultural aims of education and research. That libraries have historically been architectural monstrosities and that the newer "functional" ones continue in this vein more than we like to admit - illustrates the point that, implicitly, the library is ascribed other functional roles than that of access to information alone.

Even though the library may be found to be relatively marginal, in an immediate sense, for most productive scholarship and research, this does not detract from its absolutely vital function as an articulating symbol for the accretionary knowledge process, being the temple in which scholars from all domains of knowledge ultimately place their final testaments to posterity. In fact, the physical collocation of the artifacts of all fields of investigation within the same walls of the library building may be as close as we can ever get to an ideal "unity" of science and knowledge. The metaphoric impact on the mind of a young scholar aspirant of a library containing millions of volumes, entombing the lifetime efforts of thousands of his predecessors, is impossible to measure, but can only be surmised from the occasional testimony by those who have been so inspired, and who have had the humility and fortitude to overcome the crippling ambivalence induced by this monumental challenge from the past, or in the words of Kenneth Boulding, the magnitude of our "social transcript."(90)

Thus the exclusive focus on the production-control functions of libraries (as much as these still need drastic innovation and improvement)(90a) has obscured some of the important latent functions of the library as a monument.

This exclusive focus also has obscured an understanding on the part of librarians and other information specialists of the real role of formal publication in the social system of scholarship and research. Publication as a production function has been aptly analyzed into three processes (1) Selection for publication (2) Duplication (3) Distribution(91). In this

context most librarians regard copyright simply as "one of the bars to free communication of scientific information."(92) The new technologies of reprography and automation seem to offer a means of speeding up the process of getting information more quickly into the hands of the users, by eliminating the slow, antiquated methods of letterpress publication. In fact, the "publisher" as such may be eliminated altogether, as an unnecessary middleman of a bygone era. The computer can supplant the whole process with the author composing directly on the computer, and having the computer "print out" a finished text on demand, or transfer directly to other data banks for other machine-handling purposes. The dissemination process then becomes a service operation rather than a commercial one, thereby bypassing all those economic and other non-informational barriers which are seemingly irrelevant for the simple transmission of information, and in which publishers must endlessly involve themselves before a document can be made available to the public.

It is probable, however, that the current debate about copyright conceals a more fundamental issue. Librarians may be somewhat disconcerted to find that many scholars will ally themselves with publishers and not with librarians on this issue. The scholar does have a primary obligation to share the results of his research with the public. "Communality" is indeed one of the institutional imperatives of the research process. This norm of readily sharing of knowledge can however, be (and often is) in conflict with the scholar's motivation to do research: an authentic recognition of his contribution by his peers in the scholarly community. This problem, from the author's viewpoint, devolves less upon the protection of his work through the mechanism of copyright than upon a legitimation of the author's final record for archive institutionalization. There has been abundant research which shows that the communication value of a piece of research has been usually exhausted within the community of specialists, through oral and preprint presentation at conferences and through interpersonal communication, long before the material finds its expression "in print."(93) The imminent demise of books and journals has been predicted for years, and yet, at great private and public expense, these media seem to maintain a life of their own. The answer, of course, is that the scholar requires a definitive state for his intellectual output, which will irrevocably relate his name to a specific tangible physical document, from which other scholars may definitively cite and thereby establish a permanent locus in time and place within the citation network, relative to all other researchers and their definitive archive statements, both in the

past as well as for all future time. I would call this process the preservation of the integrity of the archive.

Therefore the copyright question, couched in terms of possible loss of royalties to the author, misses the essential point as far as the scholar is concerned. The scholar is more concerned about the "gatekeeper-attribution" process, which conventional publishing has served. An author who has attained publication in book or journal format under a prestigious publisher or editorial board, and has thereby withstood the hard scrutiny of the scholarly validation process and the financial feasibility process, has won admission to the elite of his field by passing the "gatekeeper" hurdle. And attaining publication in a discrete and (if possible) "distinctive" format guarantees formal recognition and permanent attribution of the intellectual product to its author's name. Librarians, in basing their case wholly on the altruistic plea for free information dissemination are overlooking the basic drive of scholarly productivity: personal recognition. Price observes that formal publication in a journal which confers an aura of status is the paradoxical key to maximization of the researcher's intellectual property.(94) The revolution in reprography and communication technology seems to threaten the scholar, therefore, in two ways: (1) The "gatekeeper" and refereeing process may be eliminated, with consequent lack of discrimination in "who" gets published in "what." Thus publication would no longer be a distinction in itself. (2) The author is confronted with the threat of a loss of his name and scholarly status in a common pool of "data," where different data and texts might be analyzed and recombined freely for specific purposes of information analysis. The author will then have no fixed, immutable document with which his intellectual contribution can be perpetually identified.(95)

Therefore there is an urgent need for a new definition of archive publication in the light of the new technology, if the integrity of the research process is to be preserved. If this problem can be solved, then much could be done by means of the new technology to optimize conjointly the publishing and library subsystems component of the knowledge production and dissemination process, as I have outlined in section IV. However, we must remember that what is irrational as a subsystem may still be rational from the larger view. At the present time, therefore, in view of what is known of the scholarly process, and the reward system which supports the dedication of the scholar to research, it is unlikely that scholars will willingly surrender their demand for a tangible and even somewhat idiosyncratic mode

of physical substantiation of their research output. It may be predicted, therefore, that in order to give substance to the recognition ritual which motivates scholarly endeavor, at least some libraries will have to continue to be choked with unwieldy and costly manifestations of the scholarly process in multiple sizes, shapes, and colors. Perhaps in the long run, this is not too large a social price to pay to preserve the creativity of scholarship, which thrives as much on what Jerome Bruner(96) calls the unexpected "metaphoric leap," as on a formalistic pre-emption of all objects, methods, and means.

According to the recent study of university library management for the Association of Research Libraries, "Rapid expansion of recorded information, rising costs, and growing sophistication and specialization in scholarly demands upon the library require acceleration of efforts to establish interinstitutional arrangements adequate to speed access to collections in multiple locations and, thereby, to make more efficient use of the nation's research library resources."(97) This is indeed true, however, I would submit that our knowledge of the uses of recorded knowledge is still in a primitive state (although definite progress has been made) and that before we get too deeply commited to technical innovations, simply because they are feasible, we should know what we are doing within the total knowledge system and why we are doing it.

APPENDIX

Reprographic Needs of Canadian Libraries and the Role of the National Library. A Proposal for a Feasibility Study.

A. Initial assumptions to be tested and clarified by systematic data collection.

1. It is the experience of more than a minority of institutions that the need for o.p. Canadian and other materials far exceeds the supply. Furthermore the competition among the burgeoning new as well as older libraries for the same scarce resources serves only to raise the market price of what is available, resulting in an ineffectual if not wasteful application of public funds.

2. The materials for which there is an immediate and continuing need are not restricted to any one format, but involve books, sets, serials, newspapers, pamphlets, government publications; in short, all possible formats.

3. The future will only exacerbate an already difficult situation, as more academic institutions will be established to serve the increasing enrolments. Libraries at such institutions will perforce exert even more pressure on established collections at older universities in support of their programmes. Conventional interlibrary loan and traditional interinstitutional arrangements will not suffice in environments characterized by the magnitude of student populations as are now projected for the near future. Based on the size of user populations to be served, there are strict limits on the extent to which older institutions can serve the library needs of newer institutions.

4. For a large proportion of the intensive-use material for which there is sufficient collective demand from new institutions, reprint publishers will no doubt increase their offerings on reprint programmes. However, experience has already shown that this approach is anything but a reliable method of effective collection-building. Delays of from 5 to 10 years to produce a reprint of a basic work are not uncommon among commercial reprint publishers.

5. Materials of low aggregate demand (and hence of low sales expectations), but which are occasionally intensively used in particular research projects, are not likely to be reproduced at all commercially, unless heavy public subsidizing is provided.

6. A wide variety of scarce or unique research materials exist in numerous geographically remote locations, and collections in some subjects and fields of study are so fragmented and scattered as to make productive research so time-consuming through interlibrary loan and travel as to be virtually impossible.

7. A large proportion of established collections is subject to a rapid rate of physical desintegration from paper deterioration, and hence unsuitable either for interlibrary loan transactions or local use.

8. Several Canadian institutions have made unilateral arrangements with commercial and other agencies as a means of acquiring copies in microform or xerox of desperately needed materials available in no other form. However, the results to date have in many cases been anything

A. 8. (con't)

but satisfactory, for the following reasons:

(a) The commercial company can only survive by making profits on a production-control orientation and an economy of scale which maximizes on the output of quantities of the same item. Therefore orders calling for variable formats as inputs and "one-shot" orders are not susceptible to the application of uniform standards and quality control. Results of such projects seem often to have been highly unsatisfactory to institutions making such contracts.

(b) The unilateral arrangement furthermore tends to <u>frustrate</u> rather than mitigate resource needs at the national level for the following reasons:

1) Having produced an initial copy for one institution, the commercial firm does not always find it an advantage to reproduce further copies for other institutions, because it typically requires a step and repeat process, or a reformatting of equipment for a special task which is detrimental to the cost-control efficiency of his main product.

2) If the initial photocopying venture was of sizeable proportions and yet a failure owing to the production-cost stringencies, minus quality control, under which the commercial firm did the work, the lending institution whose materials were used for the project is even less willing to have the job repeated in view of the wear and tear on collections and the special housekeeping costs involved in making the materials available on a large scale.

B. A National Reprographic Center as a possible partial solution.

Assuming that the previously stated assumptions represent problems that do exist and are therefore of significant magnitude to warrant a study, we would propose the following:

1. The National Library should organize and conduct a survey of these problems, in order to determine the dimension of the need for multi-purpose document-reproduction services in Canada, and in particular to establish:

   (a) Quantities and types of document records likely to be required now and in the future by existing and planned academic institutions.

   (b) Priorities of needs, location and distribution of resources needed now and in the future for broader access through reprographic dissemination.

   (c) Proportions of the need likely to be effectively provided by alternate sources: book publishers, reprint publishers, out-of-print dealers, microform publishers, interlibrary loan, etc.

2. Making use of the data thus collected, the Study should next evaluate the costs and benefits of alternative modes of servicing the projected residual need which will not be covered by existant dissemination media. For example, the differential costs and benefits of the following alternatives should be evaluated:

   (a) Full reprographic center established at NL

   (b) A limited reprographic center at NL to satisfy the highest percentage of needs anticipated for a defined period of time.

B. 2. (con't)

(c) Contract to commercial companies

(d) Contract to another non-profit institution already operating such a center (e.g. The Center for Research Libraries, operating via the Photolab of the University of Chicago.) (Note: the reprographic activities of this center are by policy presently limited to research-level materials.)

(e) other?

C. The following criteria should be accepted as basic working principles in the evaluation of alternative methods.

1. Any sizeable reprographic project based on the collections of public-supported institutions should require:

(a) A uniform standard of quality control should apply to the technology used and to the useability of the finished product.

(b) A particular job should be done only once and done adequately, through the production of a permanent reproducible master copy to be placed in the national center, and reproducible on specific demand from any public institution.

2. In view of the variable input and output format options which would be required for a fully serviceable reprographic center, it seems likely that the system ultimately to be established will (in view of the expense of equipment and highly trained manpower) necessarily be a deficit operation, even if a fee is charged to institutions making use of its services. Therefore the possible sources of permanent financial support need to be appraised at a fairly early stage. However, to evaluate the true costs and benefits for higher education in Canada, it would be necessary to compute the trade-off between the systematic services such a center could provide and the outcome of present arrangements which involves large investments by individual institutions in competition for the same scarce materials, a method which at best conduces to the inflationary syndrome, and produces only haphazard results for collection development.

Olin B. Murray, Jr.
Coordinator of Collection
Development

OBM/sb
11.9.70

(1) See P.A. Neher and K.A.J. Hay, "Education and Capital Misallocation in a growing economy." Canadian Jrl of Econ., v.1:609-18 (1968)

P.H. Coombs The World Educational Crisis, A Systems Analysis. London, Oxford U.P., 1968.

"An Analysis of Library Cost Trends," in D.M. Knight, ed., Libraries at Large. Report of the National Advisory Commission on Libraries. New York, Bowker, 1969, p.193-96.

W.G. Bowen. The Economics of the Major Private Universities. Berkeley, Calif., Carnegie Commission on Higher Education, 1968.

F.G.Kilgour, "The Economic Goal of Library Automation," College & Research Libraries, v.30: 307-11 (1969)

(2) John Porter, "The Democratisation of Canadian Universities and the Need for a National System." Minerva, v.8 (Jul 1970) p.339.

(3) Porter. op.cit., p.325.

(4) cf. Association of Universities and Colleges of Canada. Committee on Library Automation. Statement of Objectives. (Processed) p.2.

(5) E.g. Science Council of Canada. The Role of the Federal Government in Support of Research in Canadian Universities. (MacDonald Report) (SCC Special Study, 7) Ottawa, 1969.

A Policy for Scientific and Technical Information Dissemination. (Katz Report) (SCC Report, 6) Ottawa, 1969.

Scientific and Technical Information in Canada, pt. 1 (Tyas Report)(SCC Special Study, 8) Ottawa, 1969.

Scientific and Technical Information in Canada, pt.2 CH. 6 Libraries. (SCC Special Study, 8) Ottawa, 1969.

(6) E.g. E.E. Williams. Resources of Canadian University Libraries for Research in the Humanities and Social Sciences. Ottawa, 1962.

F.E.L. Priestley. The Humanities in Canada. Toronto, 1964.

B.V. Simon. Library Support of Medical Education and Research in Canada. Ottawa, 1964.

G.S. Bonn, Science-Technology Literature Resources in Canada. Ottawa, 1966.

R.B. Downs, Resources of Canadian Academic and Research Libraries. Ottawa, 1967.

(7) Porter. op.cit. p.1

E.A. la S. Fisher, using recent DBS statistics, disputes the contention that children of low-income families have been underrepresented at Canadian universities. Thus the shift to mass-style higher education may have been more successful in Canada than heretofore thought. See Fisher's "Financial Accessibility to Higher Education in Canada during the 1960's." C.A.U.T. Bulletin, v.18, (Summer 1970) p.92-106.

(8) Porter. loc.cit.

(9) See R.L. Meier, A Communication Theory of Urban Growth. Cambridge, Mass. MIT Press, 1962.
"... the most valid justification for the huge investments made by the public in training the next generation (in educational institutions) is that of teaching the new generation to become expert communicators... We must imagine the educational system as a conglomerate of training grounds for the sophisticated senders and receivers of tomorrow" (with the urban environment as the matrix of such productive interaction)(p.18)
" The larger the urban agglomeration, the smaller is the contribution of traditional skills, and the greater is the need for inculcating new skills drawn from the world at large and for incorporating them into the production system." (p.156)

(10) That formal education results in an increased mobility to urban centers, but without necessarily eliminating ethnic and cultural particularism is well documented in such works as R.Clignet and P. Foster, The Fortunate Few. Evanston, Northwestern Univ. Press, 1966.

For a general discussion, on a global basis, of the discontinuities between the promise of education and the failures of institutional change to meet social expectations, see Coombs, op.cit.

Political events, at least since 1968, in North America and Europe, seem to have invalidated the dichotomy between the stable, interlocking political structures of "pluralistic" liberal democratic societies and the so-called "plural" societies, characterized by cultural or ethnic cleavage, of the underdeveloped world. For the plight of the equilibrium theory of Western democracies, see S.M. Lipset, Politics and the Social Sciences, Oxford U.P., 1969.

For a recent discussion of the plural/pluralistic problem, see Leo Kuper and M.G. Smith, eds. Pluralism in Africa. Berkeley, U. of Calif.Press, 1969.

However, most discussions on the pluralism problem seem to devolve upon an overly simplistic model which is perhaps a heritage of the dichotomies of Durkheim (organic-mechanical) and Toennies (Gemeinschaft-Gesellschaft), etc. These models seem to represent dichotomies in one dimension only and omit a consideration of the horizontal as well as vertical elaboration of differentiation through stratification. Some corrective theoretic formulation can be gained through the community studies approach. For example, see T.N.Clark, Community Structure and Decision Making. San Francisco, Chandler, 1968.

(10) ... con't

As urban centers of the world become increasingly the foci both of the benefits as well as the costs (dissensus and dysfunctional processes) of social mobility, it follows that full-scale research into urban phenomena, studied as a complex system of social transactions, including formal education, is of critical importance.

To bring this problem to the campus level, the contemporary dissolution of the university in polarized and conflicting sub-groups demonstrates the failure of the theory of intersecting memberships, or differentiation in a system of social interdependencies, as a neutralizing and stabilizing factor of pluralist communities. As J.J.Schwab notes, in times of crisis the "importations of the interests of one group membership into another group are epidemic..." (College Curriculum and Student Protest, Univ. of Chicago Press, 1969, p. 277) The typology of latent vs. manifest social roles within organizations, as developed by Merton and Gouldner, provides an analytical instrument of potential insight into the level of stability of all types of organization. See R.K. Merton, "Patterns of Influence: Local and Cosmopolitan Influentials," in Social Theory and Social Structure, rev.ed. Glencoe, Free Pr., 1957, p.387-420.

Gouldner's insight is especially valuable for suggesting that latent identities and roles exert pressure upon manifest roles, "often impairing conformity with their requirements and endemically threatening the equilibrium of the manifest role system." Alvin Gouldner, "Cosmopolitans and Locals: Towards an Analysis of Latent Social Roles," Admin. Science Quarterly, v.2, 1957-58, p.286. We might make a rough inference about such phenomena, such as that in times of social "crisis," fundamental social identities and roles tend to become manifest in all social contexts.

See also J.P. Spiegel, "Campus Conflict and Professorial Egos," Trans-action, v.6, no.11, Oct 1969, p.41-50.

C.Wright Mill often criticized the functionalist models of social systems as having terms of reference too narrow for the identification of the salient defining variables, especially ignoring the historical context. For a criticism of the more recent systems models on the same grounds, see T. Bottomore, "Conservative Man," New York Review of Books, Oct 8, 1970, p.20-24; and for a critique of some of the epistemological quandaries of functionalism see M.H. Lessnoff,"Functionalism and Explanation in Social Science," Sociological Review, v.17:3, Nov 1969, p.323-40: and"Parsons' System Problems," Sociological Review, v.16, no.2, Jy 1968, 185-215.

For a viewpoint on violence and conflict as functional rather than dysfunctional phenomena, see L.A. Coser, Continuities in the Study of Social Conflicts, New York, Free Pr., 1967.

(11) The concept of knowledge as the central factor of production has now become the point of view of many workers in diverse specialties. It is either the explicit or implicit concept informing such works as Peter Drucker, The Age of Discontinuity. New York, Harper, 1968. ("... Knowledge has become the central economic resource. The systematic acquisition of knowledge ... has replaced experience ... as the foundation for productive capacity and performance." (33); R.L. Meier op.cit.; Daniel Bell has referred to "... the transformation of the university into the primary institutions of the emerging post-industrial society ..." (The Reforming of General Education, New York, Columbia U.P., 1966, p.301)

(11) ... con't

The importance of complex new communication-based linkages is inferred from N.H.Lithwick and G. Paquet's elucidation of the shift of the Canadian "transformer-distributor" structure from primary, and secondary industries to tertiary service industries, based on the externalities and economies of scale arising from the intensive urbanization of Canada. See Urban Studies: A Canadian Perspective. Toronto, Methuern, 1968, p.27, passim). For an interesting historical survey of the relationship between monetary policy and economic productivity, see Helen P. Liebel, "Inflation: Its History and Policy, 1500-1968" Dalhousie Review, v.49:1 (1969). For the case of Canada, she concludes as follows: " ... A more substantial investment in high-quality education - not in maintenance of the existing technology, but an investment in education for progress - can and would make a difference in the next five-year internal. Budget cuts or underspending in this sector will only produce a deficit as large as the amount which ought to have been spent on raising the standard of living and the skills of the community. Unless the trend to low productivity and the fear of technical progress is reversed (italics mine), the Canadian and entire North American economy will succumb to real declines, economic, social, and political, with complete disintegration of the body politic a foreseeable reality." (p.18)

While most economists still try to calculate the manpower demand, consumer demand, and "rate of return" on educational investment, according to the standard equilibrium model (For a summary, see M. Blaug, "Approaches to Educational Planning," Economic Journal, v.77:262-87 (1967), others say that conventional equilibrium or "new-equilibrium" economics is totally incapable of computing the "externalities" of education investment. "We need a theory that can measure the effectiveness of knowledge, but also the efficiency of 'knowledge industries,' and especially the efficiency of education." (Drucker, op.cit. p.44.)

(12) For a discussion of the importance of the role of external benefits and and costs in the formation of cities, see S.Tsuru, "The Economic Significance of Cities," in O.Handlin and J.Burchard, eds. The Historian and the City, Cambridge, MIT Press, 1966, p.44-55.

R.W.Clower, and others, have argued that the marginal propensity of households to save or consume wealth is the key to economic growth, and that the distribution of wealth among nations resembles that among people within the same country. Thus the marginal propensity to save is a function of a relatively tiny minority in developed western countries, and is a psychological attitude largely absent in the underdeveloped world. (See R.W. Clower, "Mainsprings of African Economic Progress." Fifth Melville J. Herskovits Memorial Lecture Edinburgh Univ., 1966.)
However, this view perhaps overlooks the built-in economic multiplier effect in the formation of cities, in that the productivity which arises from the accretion of central-place services and opportunities may well be a more significant variable in long-run economic growth than the individual's marginal propensity to save. The crux of the problem may well be innovative planned urbanization, as opposed to the mere accretion of displaced population densities into institutionally rigid urban systems.

(13) Porter. op.cit. p.339

(14) See Lithwick and Paquet, op.cit.
for an excellent exposition of the need for a concerted systems approach to the impending urban crisis in Canada.
For the specific case of a Prairie province facing an urban crisis, See R.G.McIntosh, I.E.Housego, and G. Lamont, eds. Urbanization and Urban Life in Alberta. Report of the Urban Studies Symposium... Nov. 21, 1969. Edmonton, Alberta Human Resources Research Council, 1970 ("... The pace of urbanization in (Alberta) now equals that of the most rapidly urbanizing centres in the Western world.", p.iv)

(15) D.J. de Solla Price, "Research on Research," in D.L.Arm, ed. Journeys in Science, Albuquerque, Univ. of N.Mexico Pr., 1967, p.10

(16) D.M.Heaps, and G.A.Cooke, "National Policies, National Networks, and National Information Studies in Canada," American Society for Information Science. Proceedings, 1970. p.199-203 (processed).

(17) D.J. de Solla Price. Little Science, Big Science, New York, Columbia Univ. Press, 1963.

(18) Heaps and Cooke, op. cit., p.199.

(18a) -For a recent study in this area, see T.J.Allen,J.M.Piepmeier,& S.Cooney,"Technology Transfer to Developing Countries: The International Technological Gatekeeper," ASIS Proceedings,v.7,1970, p.205-08.

(18b) -For a summary of diffusion research since 1955, see Walter Weiss,"Effects of Mass Media of Communication,"in Lindzey & Aaronson, Handbook of Social Psychology, Boston, Addison-Wesley, v.5 (1969), p.152 and also E.Katz, M.L.Levin, and H.Hamilton, "Traditions of Research in the Diffusion of Innovation," American Sociological Review, v.28, 1963: 237-52.

(18c) The controversy between "two-step " and "multi-step" is summarized in Weiss, op.cit.

(18d) For a recent reformulation of the problem of sociometric location and organizational innovativeness, see M.H. Becker, "Sociometric Location and Innovativeness: Reformulation and Extension of the Diffusion Model," in American Sociological Review, v.35, no.2, 1970, p.267-82.

(18e) Katz et al. op.cit.

(18f) Allen et al. op.cit.

See also E.B.Parker, D.A. Lingwood, and W.J.Paisley, Communication and Research Productivity in an Interdisciplinary Behavioral Science Area. Institute of Communication Research, Stanford Univ., 1968. This was a careful empirical study of the channels of information use and productivity, the main import of which was that organizations and institutions concerned with increasing research productivity "should concern themselves with the facilitation of interpersonal contact among researchers." (p.45)

(19) G. Sylvestre, "A Cooperative Acquisition Plan for Canada," Canadian Library Jrl., v.26, no.6 (1969), p.436.

(20) Kenneth Hare, On University Freedom in the Canadian Context. U. of Toronto Pr., 1968.

(21) See, for example
Commission on the Government of the University of Toronto. Toward Community in University Government. Univ. of Toronto Press, 1970.
and:
T.P. Chen, Effective Representation of Faculty Economic Interests: A Preliminary Position Paper submitted to the Assoc. of Academic Staff of the Univ. of Alberta. August, 1970 (Processed)

(21a) On the other hand, it can also be argued that the trend to convert universities into democratic communities is likely to conduce even less to the attainment of cultural and social objectives than the oligarchic pattern. It is one of the contemporary myths of the radical movement that an institution must be internally democratic to foster democratic objectives in society at large. Historically, internal oligarchy seems to have been a functional requirement for the effective operation of many so-called voluntary organizations which have promoted liberal ends. A. Etzioni points out that "organizations, unlike communities and societies, are segmental associations, which require and recruit only limited commitments of actors and in which, therefore, internal democracy is neither possible nor called for." ("Two Approaches to Organizational Analysis." Administrative Science Quarterly, v.5, Sept. 1960, p.268)

However, much of the current controversy on issues of "monolithic vs. pluralistic", or oligarchic "centralized vs. democratic decentralized" in reform of university structure is in reality a confusion resulting from a failure to define terminology. Habitually "power-sharing" in a reformed pluralistic structure is thought of in the vertical dimension only. What may really be at issue is a horizontal differentiation, or the construction of new monolithic "issue areas," which split off from the parent structure, resulting in a new specification of domains of authority and legitimacy of control. The resultant new structures are by no means egalitarian, but are new coequal monolithic formations. The North American university has never resembled the simple pyramid power structure, but has always been "complex hierarchical." The present trend may be thought of as simply a further differentiation of an established pattern. For a good discussion of stratification typologies, see T.N.Clark, "Social Stratification, Differentiation, and Integration," in Clark, Community Structure and Decision Making, San Francisco, Chandler, 1968, p.25-44.

(22) A.W.Astin and J.L. Holland, "The Environmental Assessment Technique: A Way to Measure College Environments." Jrl. of Educational Psychology, v.52, 1961, p.308-16.

and A.W.Astin, The College Environment, Wash,D.C., Amer. Council on Education, 1968.

See also A.H.Barton, "Organizational Measurement and its Bearing on the Study of College Environments," in A.Etzioni, ed., Readings on Modern Organizations, Englewood Cliffs, Prentice-Hall, 1969, 259-290.

(22) ... con't

As the EAT method produces, in effect, a profile of the predominant occupational choices, as predicated on personality variables, of a given student body, it is interesting to note that its performance on the campus of the University of Alberta reveals a predominance of a "Social" orientation in the student body. (A. Gareau and I. Jackson, The Environmental Assessment Technique (EAT). Edmonton, Univ. of Alberta, Office of Institutional Research, 1970.) (Processed.)

The "social" orientation, in Holland's six personality groups, represents a vocational choice in the fields of Education, Nursing, Sociology, Psychology, and Social work. This result is congruent with the recent socioeconomic transformation of Alberta into a predominantly urban society whose population must be rapidly mobilized to perform the complex communicative and service functions of the emergent metropolis. (cf. Notes 9-14 preceding)

Credit is due Daniel Bergen for trying to bring to the attention of academic librarians the importance of study of the university as a social system. See his "Socio-psychological Research on College Environments," College and Research Libraries, v.23 (1962), 473-81.

(23) See R.H. Knapp and L.A. Ehlinger, "Styles of Scholarly Production," Journal of Educational Research, v.61, no.5, 243-49.

and

A.W. Gouldner, "Cosmopolitans and Locals: Toward an Analysis of Latent Social Roles, " Admin. Science Quart., v.2 (1957-58):281-306, 444-480.

(24) A. Etzioni. op.cit., and V. Thiessen and M. Iutcovich,"Some Comments on Edward Gross's "Universities as Organizations: A Research Approach," " Amer. Sociologist, v.5, no.3 (Aug. 1970) 252-54.

(24a) D.Katz and R.L.Kahn have delineated this organizational problem very cogently in the format of general systems theory. Open systems, to survive, must acquire and store more energy from their environments than they expend. The energy thus stored within systems is known as "negative entropy." (SEE Katz and Kahn, Social Psychology of Organizations, N.Y., Wiley, 1966, p.21)

It is furthermore useful to analyze an organization into functional subsystems according to the Parsonian paradigm: Adaptation, Goal-Attainment, Integration, Latent Pattern Maintenance. (cf. T. Parsons and N.J. Smelser, Economy and Society, Glencoe, Free Pr.,1956)

Katz and Kahn, in a similar perspective, have developed the following generic subsystems for social organizations: Production or Technical Subsystems (concerned with the transformation of inputs into the desired output or product, Supportive Subsystems (carrying on transactions with the environment to recruit resources as inputs, and otherwise concerned with maintaining an environment favorable to the work of the production subsystem), Maintenance Subsystems, and Reward and Sanctioning Systems (concerned with "pattern maintenance," or the structures necessary for accomplishing the work of the system, Adaptive Subsystems (concerned with sensing relevant changes in the external environment and organizational response, Managerial Subsystems (concerned with coordination of other subsystems) See Katz and Kahn, op.cit., p.39-47.

(25) F.E. Rourke and G.E. Brooks, "Computers and University Administration," Admin. Science Quarterly, v.11 (1966), 575-600.

(26) "The Chairmanship in a Changing Academic Setting: Sociology's Crisis in Leadership." Pacific Sociol. Review, v.13, no.1 (1970)

(27) Price. "Research on Research." op.cit. p.13

For an account of a recent reassessment of the relationship between scientific publication and productivity in the Soviet Context, see L.N. Beck, "Soviet Discussion of the Exponential Growth of Scientific Publications," ASIS Proceedings, v.7 (1970), p.5-10

(28) H.L.Resnikoff and J.L.Dolby, "On Economic Growth of Nations and Archival Acquisitions rates," in Dolby and Resnikoff, An Evaluation of the Utility and Cost of Computerized Library Catalogues, Final Report, Wash. D.C., Off. of Educ., 1968, p.134-163.

(28a) See R.A.Fairthorne, "Response," in E.B.Montgomery, ed. Foundations of Access to Knowledge. Syracuse Univ. Press, 1968, p.89-93.
" ... to say that a machine uses words and numbers is misleading. It doesn't use them, it mentions them." "Actually, the only way you can describe a text is to make a photograph of it. For that is all the text, as such, is. Just marks."

(29) K.Krippendorff, "Introd.- Theories and Analytical Constructs," in G. Gerber, et al. The Analysis of Communication Content. New York, Wiley, 1969, p.5.
Despite intensive work in recent times to relate linguistic structure to meaning, a statement made in 1952 by Lasswell, Lerner, and Pool still applies: " There is almost no theory of language which predicts the specific words one will emit in the course of expressing the content of ... thought". (The Comparative Study of Symbols, Stanford Univ.Pr., 1952, p.49.)
The obverse of this problem, for information retrieval, is that there is no way to predict what thought will be elicited by specific words, abstracted from the situational context. cf. Patrick Meredith, Instruments of Communication. Oxford, Pergamon, 1966, p.48.

(30) See W.A.Sedelow, "Comment-Science and the Language of History." Behavioral Science, v.2 (1957), p.81: "No operationally validated meanings have yet been established for the role of words in perception."

(31) L.B. Heilprin, "Response" to J.H. Shera, "An Epistemological Foundation for Library Science," in E.B.Montgomery, op.cit., p.26-35.

(32) cf. Sedelow. op.cit. cf. Merton, note (63) and Ziman (66a)

cf. Kuhn's concept of "normal" science as a necessarily suppressive force against new "subversive" ideas. (Thomas S. Kuhn, The Structure of Scientific Revolations. Chicago, Univ. of Chicago Press, 1962, p.5)

(33) K. Deutsch, "On Theories, Taxonomies, and Models as Communication Codes for Organizing Information," Behavioral Science, v.11(1966), p.1-17.

(34) Ibid., p.12.

(35) Price. Little Science, Big Science, op.cit.

(36) e.g. Diana Crane. Social Structure in a Group of Scientists: Test of the "Invisible College" Hypothesis. Baltimore, Johns Hopkins Univ. Press, 1968. and Susan Crawford, "Communication Centrality and Performance," ASIS Proceedings, 1970, p.45-48.

(37) E.B.Parker, D.A. Lingwood, W.J. Paisley, Communication and Research Productivity in an Interdisciplinary Behavioral Science Research Area. Inst. of Communications Research, Stanford Univ., 1968, p.38.

(38) W.O.Hagstrom, The Scientific Community, New York, Basic, 1965.

(39) R.Lippitt, "The Process of Utilization of Social Research to Improve Social Practice," Amer. Jrl. of Ortho-psychiatry, v.25 (1965), 663-69.

(40) P.H.Abelson, "Custodians of Knowledge," Science, v.159 (1968), p.582.

(41) R.H.Knapp, The Origins of American Humanistic Scholars. Prentice-Hall, 1964, p.163.

(42) K.D.Metcalf, "Facing the Consequences of Growth," in E.E.Williams, ed., Problems and Prospects of the Research Library. New Brunswick, Scarecrow, 1955, p.126.

(43) W.N.Locke, "Computer Costs for Large Libraries." Datamation, Feb 1970, p.69-74.

(44) W.G.Bowen. op.cit.

(45) R.L.Meier. "Communications Overload: Proposals from the Study of a University Library." Admin. Sci. Quart., v.7 (1963), p.527.
and
R.H.Logsdon, "The Librarian and the Scholar: Eternal Enemies." Library Journal, Sept 15, 1970, p.2872.

(46) Meier. op.cit., p.533.

(47) cf. Robert Boguslaw. The New Utopians: A Study of Systems Design and Social Change. Englewood Cliffs, Prentice, 1965.
and
V.A.Thompson, "How Scientific Management Thwarts Innovation," Trans-action, June 1968, p.51-55.

(48) Chris Argyris. Organization and Innovation. Homewood, Ill., R.D. Irwin, 1965.

(49) cf. R. Likert and S. Seashore, "Making Cost Control Work," Harvard Business Review. v.41 (1963), 96-108.

(50) A.J.Marrow, D.G.Bowers, S.E.Seashore, Management by Participation; Creating a Climate for Personal and Organizational Development. New York, Harper, 1967.

As mentioned in Note 21, there is, however, an argument for an organization to operate as an oligarchy, since the participatory process introduces many redundant personal variables, which may retard the establishment and implementation of operational objectives. But the "climate of the times" is such that the attitude of the average employee has undergone a shift from a lower to a higher-level need-hierarchy. In an age of relative affluence, people no longer work for a "living" or go to school to "learn." Having satisfied basic wants in these areas, secondary needs and drives become all the more imperative. See Marrow, et al., p.253.

Modern organizations are riven by the dilemma described by Scott and Blau, that the teamwork and participatory approach yields the best results in communication, problem-definition and problem-solving, but implementation requires more coordination and centralized control. See "Dilemmas of Formal Organization," in A. Etzioni. Readings on Modern Organizations, op.cit., p.138-47.

(51) Likert. op.cit.

(51a) One of the key issues in building an adaptive, productive organization is that of the continuing education and professional development of the individual members. For an interesting recent appraisal of the traditional ambivalance of library organizations toward this responsibility, see A.V.Joynas,"Recyclage permanent des bibliothecaires: illusion ou réalité?" Bull. Assoc. Canad. des Bibliothecaires de langue française, v.16, no.3 (Sept.1970), p.132-42.

(52) See Victor Thompson, "Bureaucracy and Innovation." Admin. Sci. Quart., v.10 (1965), 1-20.

(53) cf. Ben-Ami Lipetz, "Information Storage and Retrieval," Scientific American, v.215, (1966) 223-42.

(54) H.H.Fussler and J.J.Simon, Patterns in the Use of Books in Large Research Libraries, Univ. of Chicago Pr., 1969, p.31 and 147.

See W.J.Paisley, "Information Needs and Uses," in C.Cuadra, ed. Annual Review of Information Science and Technology, v.3 (1968) p.1-30, for a conceptual design for a valid analysis of the complex of factors involved in relating user needs to information resources.

(55) Fussler and Simon. op.cit., p.268

(56) Ibid., p.31, 147
and
R.W. Trueswell, "User Circulation Satisfaction vs. Size of Holdings at Three Academic Libraries, "College and Research Libraries, May 1969, p. 204-213.

(57) See Ben-Ami Lipetz, "Management Considerations in Evaluating Library Automation," in P.J. Fasana, ed. Institute on Automation in Large Libraries, Univ. de Montreal, 1968, p.135-52.

(58) Parker, Lingwood, Paisley. op.cit.

(59) cf. Knapp. The Origins of American Humanistic Scholars. loc.cit.

(60) Gouldner, op.cit.

(60a) See Gouldner, op.cit., p.466.
M.H.Becker, "Sociometric Location and Innovativeness: Reformulation and Extension of the Diffusion Model," Amer.-Sociol. Review, v.35, no.2, 1970, p.267-82.
M. Abrahamson, "Cosmopolitanism, Dependence-Identification and Geographical Mobility," Admin. Sci. Quarterly, v.10 (1965), 98-106.

S. Crawford, "Communication Centrality and Performance," ASIS Proceedings, 1970, p.45-48.

(61) N.W. Storer and T. Parsons, "The Disciplines as a Differentiating Force," in Montgomery, op.cit., p.101-21.
The "classic" exposition of the institutional imperatives of science are by Merton, consisting of the following:
1. universalism 2."communism" 3.Disinterestedness 4. Organized skepticism. See R.K.Merton, "Science and Democratic Social Structure" (1942) Reprinted in Merton, Social Theory and Social Structure. Rev. ed. Glencoe, Free Press, 1957, p.550-61.

(62) cf. Heilprin. op.cit.

(63) R.K. Merton, "Priorities in Scientific Discovery, A Chapter in the Sociology of Science," Amer. Sociol. Rev., v.22 (1957) 635-59. See also Merton's whimsical exposition of this problem in his On the Shoulders of Giants, A Shandean Postscript. New York, Free Press, 1965.

(64) See N.Kaplan, "The Norms of Citation Behavior: Prolegomena to the Footnote," American Documentation, v.16 (1965), 179-84.
and
J.M.Chase, "Normative Criteria for Scientific Publication," American Sociologist, v.4 (1970), 262-65. A possible implication of this study, which found that the normative criteria for publication vary between fields, is that the classic elucidation of the institutional imperatives may need to be revised as a function of specific fields in a specific context of time and place.

(65) See, for example E.B.Parker, et.al. Bibliographic Citations as Unobtrusive Measures of Scientific Communication. Stanford Univ., 1967 (CFSTI PB177-073). This study found in general, no rise in the citation of unpublished works among a group of 17 behavioral science journals. A more important finding for the structure of invisible colleges, was that several of these journals, though related, cite little from each other, thus suggesting the "in-group" nature of certain specialties.

(66) Note, for example, the Reports of the American Psychological Association's Project on Scientific Information Exchange in Psychology, v.1 (1963), v.2 1965, Washington, D.C.

(66a) J.M. Ziman quite aptly criticizes one of the current trends to get "information" out to wider audiences faster by "formalizing" the informal distribution of preprints from special information centers. This procedure violates the rationale of the scholarly attribution process, and could endanger the reward system by which scholars achieve formal recognition for their labors, which does not ensue from speed in rushing into print, but from a slow and continuous interaction and informal exchange among one's colleagues before finally producing the formal archive paper, which has undergone a proper legitimation through peer consensus in the refereeing process. (J.M. Ziman, Public Knowledge; An Essay Concerning the Social Dimension of Science, Cambridge, Univ. Press. 1968, p.111 ff)

cf. Derek de Sola Price on "The mythology of the archive," in D.L.Arm, op.cit., p.10.

(67) For an interesting approach to the problem of optimization in social systems, as a function of cultural learning capacity, see K.W. Deutsch, "Knowledge in the Growth of Civilization: A Cybernetic Approach to the History of Human Thought." in Montgomery, op.cit.,p.37-58.

I shall omit a discussion of the abstruse subject of network "taxonomies" as being more appropriate for engineering models than for the construction of viable social systems. However, I would recommend that network design and planning needs to take serious cognizance of the domain of multi-dimensional stratification theory in sociology and political science as providing a more apt model for formulating the social-role functions and their transformation, which is at the heart of the problem. (See my discussion and references under note 21a)

(67a) T.N.Clark, "Social Stratification" in Clark,ed. Community Structure and Decision-Making, San Francisco, Chandler, 1968, p.33.

(67b) See, for example, L.E.Leonard, J. Maier, and R.M.Dougherty. Centralized Book Processing: A Feasibility Study Based on Colorado Academic Libraries. Metuchen, N.J., Scarecrow, 1969.

(68) The concept was originally formulated by Marcel Mauss in "Essai sur le don," (1923), reprinted in Sociologie et Anthropologie. Paris, PUF, 1950.

A systematic modern treatment is in Peter M. Blau, Exchange and Power in Social Life. New York, Wiley, 1964.

(69) Also somewhat derivative of Mauss is the version of exchange theory at the root of Levi-Strauss' universalistic theory of social structure predicated on the use of women in marriage as a system of communication between different cultures. See, for example, Les Structures elementaires de la Parente 1949, recently in English translation by J.H.Bell et al. Eyre & Spottiswoode, 1969.

(69a) See Alvin Gouldner, "The Norm of Reciprocity," America Sociological Review, v.25 (1960), p.161-178.

(70) T.N.Clark, "The Concept of Power," in Clark, ed, op.cit., p.49.

(70a) For a systematic discussion of power and influence and their attributes as circulating media in social systems, see T.Parsons, "On the Concept of Influence," in Public Opinion Quarterly, v.28, 1963, p.37-62, and "On the Concept of Political Power," Proceedings of the American Philosophical Society, v.107 (1963), p.232-62. For a useful account of the asymetrism problem, see R.K.Merton, "Patterns of Influence: Local and Cosmopolitan Influentials," in Social Theory and Social Structure, Rev.ed., Glencoe, Free Press, 1957, p.410 ff.

(71) See B.J.Garner, "Models of Urban Geography and Settlement Location," in R.J.Chorley and P. Haggett, eds. Models in Geography. London, Methuen, 1967, p.303-360.

(72) D.M.Ray, "Urban Growth and the Concept of Functional Region," in Lithwick and Paquet, op.cit., p.40-91.

(72a) There is an interesting correspondence between central-place theory in urban center formation and the effects of what are sometimes called "central persons" in invisible college networks. In both cases we have instances of behavioral units which wax stronger and more eminent at the expense of the weaker. To take account of this correspondence in two different realms, which are however related, we might apply the term "central person-place theory." And that the perpetration or survival of a core of elite journals for a given field answers to the same process suggests a further elaboration as "central medium theory."

Perhaps the clearest formulation of this phenomenon, as far as communities of scientists are concerned, is in R.K.Merton's "The Matthew Effect in Science," (Science, v.159, 1968, p.56-63), in which the scriptures yielded a poetic formulation for Merton's insight: "For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath." More recent empirical research has further confirmed earlier research on this process operative within the context of the invisible college phenomenon (E.g. Crane, op.cit. and Crawford, op.cit.) The essential finding from sociometric analysis of the membership of invisible colleges is that there is a stable core of eminent workers surrounded by a much larger population of floating researchers who enter the field as collaborators and leave after a short time, such that the "death rate" of this segment of the invisible college is approximately equal to the "birth rate." Whereas the contribution of the minor workers to the field may be significant, the prestige and allocation of recognition accrues to those already eminent in the field. Merton calls the phenomenon whereby new members are constantly attracted into the field by the eminent figures a process of "focalization." In unglamorous language it might be said that the eminent scientists "milk" the minor workers according to the limits of their particular capacities to contribute, and then drive them from the fold.

From the point of view of General Systems Theory, we might say that urban formation and invisible college formation are both processes of negative entropy formation, whereby nodes of preponderating influence are set up in a system which progressively indebts the lesser contributors to the greater. In the case of urban centers or formal organizations such as universities, these imbalances of communication flow tend to be institutionalized in a system of stratified hierarchies, thus achieving legitimation as a manifest process. The invisible college, however, being in essence the world community of scholars working in a specific area, is not subject to such

(72a) ... con't

institutionalization. Therefore, the normal tendency of the invisible college, based on the asymetrism of transactions within a social system, to eventuate in an institutionalized stratification system is precluded by the fact that it is not allowed to attain such institutionalization. Therefore as the latent stratification of such informal systems attains a level which demands a manifest recognition, there is no alternative but that the low producers of the system must be weeded out by attrition.

In the following schematic I have attempted a provisional map for the unification of the various strains of role-theory formulation which bear on the knowledge-production and diffusion process.

Suggested Map of Role Influentials and Information Exchange in a Field of Research:

Manifest Roles (e.g. institutionalization, formal organization) Merton Gouldner

Latency Roles

Flow of influence and information (Heavy arrows suggest imbalance in direction of flows)

Refer to Parsons for Influence as a circulating medium. Refer to Merton for "Matthew effect" Refer to General Systems Theory for negative entropy formation.

Invisible College (Price, Crane, Crawford, etc.)
(LATENCY ROLE)

Teaching Dept. or R. & D. organization, including formal information services such as libraries
(MANIFEST ROLE)

(LATENCY ROLE)
"Pure Cosmopolitan" Sociometric centrality in invisible college only. (Gouldner)

(LATENCY ROLE)
"Pure" Local influential with sociometric centrality within formal organization only (Gouldner)

ILLUSTRATING Diffusion tradition of Lazarsfeld, Katz, Menzel, etc. 2-step model of adoption of innovation by local organization.

(LATENCY ROLE)
"Mixed" Cosmopolitan/Local influential, situated at intersection of invisible college and formal organization. Has sociometric centrality in both local institution and in invisible college. Performs Gatekeeper-mediator function of introducing innovation into local formal organization, and key to productivity of the formal system. (Gouldner, Lazarsfeld, Katz, etc.)

(73) Cited in McIntosh, Housego, and Lamont, op.cit., p.2

(74) cf. Porter. op.cit.
See M.Oliver, "Research in the Social Sciences," AUCC Proceedings, 1967, v.2, p.113-22.

(75) A.M.Cartter, An Assessment of Quality in Graduate Education. Washington, Amer. Council on Educ., 1966, p.114-15.

(76) Knapp. op.cit.

(77) cf. Priestley, op.cit., p.59

(77a) cf. the notion of a "critical mass" of workers in the same specialty in the same locale as a prerequisite of productivity. Some empirical corroboration of this factor is found in Parker, Lingwood, Paisley, op.cit., p.44 passim.

(78) See N.H.Lithwick and G. Paquet, "Urban Growth and Regional Contagion," in Lithwick and Paquet, op.cit., p.27 ff.

(79) D. Bell, op.cit., p.301

(80) Dan Lacy, "The Traditional Library" in L.Carnovsky, ed. Library Networks--Promise and Performance., Univ. of Chicago Press, 1969, p.19.

(81) cf. Trueswell. op.cit.
Fussler. op.cit.
G.Williams. op.cit.

(81a) National Library of Canada. An Integrated Information System for the National Library of Canada. A Summary of the Report of the Systems Development Project. Ottawa, 1970.

(81b) See R.E.Chapin, "Limits of Local Self-Sufficiency," Conference of Interlibrary Communications and Information Networks, Warrenton, Va., Sept. 27-Oct.2, 1970, Paper A-4 (Processed).

(81c) Some work has been done to mitigate this problem through analysis of circulation data to determine added-copy needs. See for example Peter Simmons, "Improving Collections through Computer Analysis of Circulation Records in a University Library," ASIS Proceedings, v.7 (1970), p.59-63.

(82) Priestley, op.cit., p.55

(83) E.E.Williams, "Bibliographical Control and Physical Dissemination," in On Research Libraries: Statement and Recommendations of the Committee on Research Libraries of the American Council of Learned Societies, Wash., 1967, p.39.

(84) E.E.Williams, Resources of Canadian University Libraries, op.cit., p.54 ff.

(85) Cf. Harvard University. Faculty of Arts and Sciences. Report of the Committee on Recruitment and Retention of Faculty. Cambridge, Harvard Univ., 1968 (Cited in F.G.Kilgour, "The Economic Goal of Library Automation," College and Research Libraries, v.30 (1969), p.307.)

(86) Harvard. op.cit.

(87) B.A.Lipetz and P. Stangl, "User clues in initiating Searches in a Large Library Catalog," in Amer. Soc. for Info. Science, Proceedings, vol.5, p.137-39, New York, Greenwood, 1968.

(87a) For an example of computer-aided evaluation of collections of the Univ. of British Columbia, Peter Simmons, "Improving Collections through Computer Analysis of Circulation Records in a University Library," ASIS Proceedings (1970), p.59-63.

(88) Merton, R.K. "The Ambivalence of Scientists" (1963). in N. Kaplan, ed. Science and Society, New York, Rand McNally, 1965.

(89) D. de Sola Price, "Research on Research," op.cit., p.10.

(90) Kenneth E. Boulding, The Image. Ann Arbor, Univ. of

(90a) See, for example, Booz, Allen, and Himilton, Problems in University Library Management. Washington, Assoc. for Research Libraries, 1970.

(91) Ralph R. Shaw, "Publication and Distribution of Scientific Literature," College & Research Libraries, July 1956, p.293.

(92) Ibid. p.302.

(93) cf. the Reports of the American Psychological Association's Project on Information Exchange in Psychology, v.1-3, 1963-69.

(94) Price, op.cit. p.10.

(95) Marsh Jeanneret, Director of the Univ. of Toronto Press, states: "The rapidly evolving technology of communication will affect not only traditional publishing procedures, but authorship itself... In the end, it is the copyright alone that is the common stock-in-trade of authors and their publishers." (Editorial: Universities as publishers," Scholarly Publishing, v.1 (Oct. 1969) p.4.

(96) J.S.Bruner, On Knowing. Cambridge, Harvard Univ. Press, 1962. p.20.

(97) Booz, Allen, Hamilton. op.cit. p.4.